CADHAM
PROVINCIAL
LABORATORY

Serving Manitoba since 1897

Guide to Services 2012

Manitoba

CADHAM PROVINCIAL LABORATORY

MANITOBA HEALTH

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December 2011

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RESPONSIBILITIES

Cadham Provincial Laboratory (CPL) is responsible for several province-wide public health, reference and diagnostic services.

It is the central public health microbiology reference laboratory for Manitoba and supports Manitoba Health disease control programs.

CPL is directly linked to the Public Health Branch of the Public Health and Primary Health Care Division in surveillance of communicable diseases and is the principal laboratory participant in outbreak investigations.

CPL is also the sole centre for laboratory services in virology, chlamydiology and infectious diseases serology and serves patients, practitioners and public health units in Manitoba, and parts of Nunavut, Northwest Ontario and Saskatchewan.

CPL provides newborn screening and maternal serum screening for Manitoba.

CPL co-ordinates and conducts the evaluation of suspicious packages and substances for biohazardous materials for Manitoba.

CPL also participates in the training of physicians, nurses and graduate students, and conducts research in fields of public health relevance.

SENIOR STAFF

Administration	
Medical Director: P. Van Caeseele, MD FRCPC	945-6456
Assistant Medical Director: J. Bullard, MD FRCPC	945-1306
Administrative Director	945-6302
Privacy Officer	945-6456
Administrative Officer	945-6337
Education Co-ordinator	945-6230
Outbreak Co-ordinator	945-7473
Safety and Compliance Officer	945-6845
Clinical Microbiology	
Chief Technologist	945-7184
Scientist; Classical	945-7278
Scientist; Molecular	945-7473
Information Management	
Data Entry Supervisor	945-8001
Section Chief	945-2417
Newborn Screening and Public Health Chemistry	
Chief Technologist	945-7980
Scientist	945-8021
Serology and Parasitology	
Chief Technologist	945-7582
Scientist	945-7545
Technical Support Services	
Chief Technologist	945-6230
Virology	
Chief Technologist	945-6858
Scientist; Virus Detection	945-6878
Scientist; Virus Research	945-7136

ABBREVIATIONS USED

2 SP CTM = Chlamydia transport medium
Ab = antibody
AD = antigen detection
ADB = anti-DNAase B
Agg = agglutination
AIDS = acquired immunodeficiency syndrome
ALC = 70 percent alcohol
ASOT = antistreptolysin O titre
BAD = bacterial antigen detection
C & S = culture and sensitivity
CMV = cytomegalovirus
CONV = convalescent
CPL = Cadham Provincial Laboratory
CQI = continuous quality improvement
CSF = cerebrospinal fluid
CT = cytotoxicity or chlamydia trachomatis
DFA = direct fluorescent antibody
EDC = expected date of confinement
EIA = enzyme immunoassay
EM = electron microscopy
ESBL = extended spectrum beta lactamase producing
FAOD = fatty acid oxidation disorders
FBI = food-borne illness
FVT = fecal verotoxin
GC = gonorrhea
HA = hemagglutination
HAV = hepatitis A virus
HBV = hepatitis B virus
HCV = hepatitis C virus
HI = hemagglutination-inhibition
HIV = human immunodeficiency virus
HSV = herpes simplex virus
HTLV = human T-lymphotrophic virus
ID = immunodiffusion
IFA = indirect fluorescent antibody
IHA = indirect hemagglutination
IMA = immunochromatographic membrane assay
KOH = potassium hydroxide
LA = latex agglutination
LCM = lymphocytic choriomeningitis
LGV = lymphogranuloma venereum
MoAb = monoclonal antibody
MOH = Medical Officer of Health
MRSA = methicillin resistant *Staphylococcus aureus*
NAAT = nucleic acid amplification test
NAD = nucleic acid detection
NAT = nucleic acid testing
NML = National Microbiology Laboratory
NPA = nasopharyngeal aspirate
NPS = nasopharyngeal swab
NT = neutralization
PCR = polymerase chain reaction
PFGE = pulsed field gel electrophoresis
PHA = passive hemagglutination
PHI = Public Health Inspector
PHIN = personal health information number
PHN = Public Health Nurse
QA = quality assurance
QC = quality control
RHA = Regional Health Authority
RDA = RNA/DNA amplification
RFLP = restriction fragment length polymorphism
RPHA = reverse passive hemagglutination
RPR = rapid plasma reagin assay
SA = sexual assault
SAF = sodium acetate acetic acid formalin
SARS = severe acute respiratory syndrome
SST = Serum separator tube
STAT = high priority
STI = sexually transmitted infection
TB = tuberculosis
TDG = transportation of dangerous goods
TDGR = transportation of dangerous goods regulations
TI = (1-2%) tincture of Iodine
TM = transport medium
VHF = viral hemorrhagic fever
VISA = vancomycin-intermediate *Staphylococcus aureus*
VRE = vancomycin resistant enterococcus
VRSA = vancomycin resistant *Staphylococcus aureus*
VT = verotoxin
VTM = viral transport medium
WB = Western blot

GENERAL GUIDE TO LABORATORY USE

Services

Cadham Provincial Laboratory provides public health laboratory services that include Microbiology, Virology, Parasitology, Serology, Newborn Screening, Public Health Chemistry and Quality Assurance. Reference services for identification and typing of microorganisms are available to all medical and veterinary laboratories in the Province.

Services are available to all registered medical practitioners and midwives, hospitals, health units, medical officers of health, public health inspectors and other recognized health practitioners. There is a charge for laboratory services to patients not insured by Manitoba Health.

Advice is provided by the senior staff on laboratory issues relating to communicable disease. Staff members may visit hospitals or places where outbreaks are occurring at the request of appropriate authorities.

Hours of Operation

The regular hours of service are 0800 to 1630 hrs., Monday to Friday. The laboratory is partially staffed on Saturdays, Sundays and statutory holidays.

Patient Inquiry Services

Results are provided to authorized personnel for all telephone inquiries, Monday to Friday, 0800-1630; Saturday and Sunday, 0800-1600 (urgent requests outside of the regular operating hours will be responded to by the medical staff on-call).

STAT Testing:

Please ask yourself these questions before making a STAT request:

1. *Why is test required "STAT"? Could this wait till the next regular shift in the Laboratory?*
2. *Will doing this test after hours "STAT" alter the management of the patient?*

STAT testing is available 24 hours a day as follows:

Monday through Friday:

- STAT testing must be arranged through the appropriate Section of CPL prior to shipment.
- A requisition with the appropriate information and clearly marked STAT (a colored sticker is optimum) must accompany the specimen.
- Prior approval from CPL's medical staff or an Infectious Disease Specialist must be obtained for STAT viral testing.

- Prior approval must be obtained from CPL's medical staff for all remaining STAT testing, except for organ donor emergencies.

After 4:30 p.m., and on Weekends and Holidays (call back):
- Call (204) 945-6655 and the on-site Security Guard will refer the call to the medical staff on call.

Specimen Delivery
Specimens may be delivered at any time, but may not be processed until the next business day if delivered after 1600 hrs.

Specimen Hazards
Specimens that break or leak during transport pose a serious physical and infection risk to staff that transport, receive or process them. All specimens sent to the laboratory must be properly packaged and transported. Refer to Packaging and Transport of Specimens (see section 1.3). If the shipper's location and/or the patient specimen can be identified without peril to staff, CPL will notify the sender.

Reporting Procedure
Positive results of epidemiological importance or which are likely to be required with urgency by the physician are telephoned with hard copy reports to follow.

Reports issued are for the information of medical or public health staff primarily.

Practitioners requiring further interpretation of CPL results may contact the physician on-call at 945-6123 or after hours at 945-6655. Referral of patients directly to CPL for interpretation is not recommended.

Alert/Critical Results Call Practice
Preamble: Listed results will be telephoned and/or reported via fax to the physician or other clinical personnel responsible for the patient's care.

1.0 Virology:

- All STAT Results
- CMV PCR positives
- Positive preliminary enterovirus results on patients with myocarditis, pericarditis, CNS symptoms, newborns or pregnant women.
- Outbreak results
- Positive results from immunocompromised patients

- Positive results on all invasive specimens
- Positive rapid RSV results
- Requests for telephone results

2.0 Clinical Microbiology:

- Methicillin resistant *Staphylococcus aureus*
- Vancomycin resistant Enterococcus
- *Legionella*
- *Bordetella pertussis and parapertussis*
- Corynebacterium diphtheriae

- From all sterile fluids and sterile sites (e.g. CSF, pleural fluid, etc.):
  all positive direct smears
  all isolates - preliminary and final.

- All enteric pathogens - preliminary and final.
  EXCEPTION - multiple simultaneous samples on the same patient.

- *Blastomyces dermatitidis* - presumptive from KOH and culture, and final confirmed results.

- *Clostridium difficile* toxin positive results

- Verotoxin positive results

- Any unusual or high profile isolates, e.g. a suspected risk level 3 organism.

- Any results specifically requested to be phoned or 'STAT' results.

3.0 Serology

- Needle stick on request
- Organ donor results
- Positive results for:
  - Measles or Rubella IgM
  - Hepatitis A - IgM
  - New syphilis (only during outbreaks)
  - Hanta IgM
  - SARS antibody

4.0 Newborn Screening and Public Health Chemistry

- Newborn Screening
  All samples exceeding critical limits are referred to a pediatric geneticist or endocrinologist.
- Maternal Serum Screening
  Amnios > 2.0 MoM

BIOHAZARD RESPONSE TEAM

Cadham Provincial Laboratory and the Office of the Chief Medical Officer of Health co-ordinate and conduct the evaluation of suspicious packages and substances for biohazardous materials for Manitoba.

Any spill or suspicious package/substance response first requires triage of the event through the regional or on-call Medical Officer of Health (MOH). **CPL only responds to requests from MOHs in this regard**. The MOH may be reached at the regional public health office or after hours at (204) 788-8666.

The Manitoba team members for Health Canada's Emergency Response Assistance Plan for biosafety level 4 material are located at CPL and may also be reached at (204) 788-8666.

OUTBREAK RESPONSE SUPPORT

Cadham Provincial Laboratory provides laboratory support to Public Health and health care facilities in the investigation of outbreaks.
Note: When submitting specimens for outbreaks, include any history available and transport immediately and directly to CPL. Utilize CPL expertise to ensure appropriate specimens are collected.

An outbreak is the occurrence in a defined area of cases of an illness with a frequency clearly in excess of normal expectancy. The number of cases indicating presence of an outbreak will vary according to the infectious agent, size or type of population exposed to the disease, previous experience or lack of exposure to the disease, and time and place of occurrence. Therefore, the status of an outbreak is relative to the usual frequency of the disease in the same area among the same population, at the same season of the year.[1] Commonly, outbreaks involve gastrointestinal illness, with or without a food-borne component, respiratory illness or parasitic infestation. Antimicrobial-resistant organisms, primarily as colonization, may also be investigated as an outbreak.

Knowledge of circulating pathogens and early detection of new or re-emerging organisms is paramount to disease prevention and control. CPL contributes to this general surveillance by electronic reporting of reportable diseases to Public Health, by informal reports at Infectious Disease reviews, by surveillance programs and through consultations with section staff.

Reports of suspected or actual outbreaks come to CPL from a variety of individuals who may include infection control practitioners, public health nurses, medical officers of health (MOH), public health inspectors (in the case of food-borne illness) and occasionally concerned citizens. Response to this information will vary depending on the nature of the outbreak:

1) Additional or rapid testing may be done on specimens after discussion between laboratory and public health care facility staff.

2) When an outbreak involves or is anticipated to involve numerous individuals, the MOH or designate may request an outbreak code to be applied to all outbreak samples. This code enables samples to be traced more easily and provides phone reports of positives, where appropriate, and written reports of negatives and positives on a daily basis to the MOH. To obtain a code, the MOH or designate contacts the CPL Outbreak Co-ordinator (945-7473) with a summary of the outbreak and

the type of testing desired i.e., virology, bacteriology, toxin detection, serology, or parasitology. Advice regarding appropriate investigations and specimens is available from CPL medical staff or section chief technologists. The MOH or designate then requests the facility, public health nurse or inspector to add the code to all requisitions related to the outbreak.

3) During an outbreak, clear communication amongst disciplines is essential. CPL may refer the health care facility/individual to Public Health, may call Public Health directly or may do both. Effort is made to expedite delivery of specimens and to attempt to have laboratory results available to the Public Health Outbreak Co-ordinator at the earliest opportunity. Diseases that are reportable by provincial regulation are reported electronically to the CDC Branch of Manitoba Health on a daily basis. In food-borne illness outbreaks, liaison between CPL and an environmental testing laboratory may occur when both environmental and human specimens are being tested.

Outbreak investigation usually involves testing approximately six affected individuals and not more than ten. Specimens should be taken from appropriate sites and placed in appropriate containers and transport medium when applicable (see sections 2, 3, 4 or 7). They should be sent as soon as possible to CPL in appropriate transport containers and under appropriate conditions (see Section 1). Specimens which leak, are damaged or lack appropriate identification (two unique identifiers such as name and PHIN) cannot be processed. Requisitions must be filled out **completely** and where applicable, clearly indicate the outbreak code. Adding "outbreak" or "food-borne illness" if applicable is also helpful.

Supplies for collection and transportation of specimens may be obtained from CPL (see Section 1.5).

Outbreaks involving antimicrobial-resistant organisms e.g., MRSA, VRE, are usually managed by the infection control practitioner(s) of the health care facility. Arrangements may be made for tracking of specimens and reporting of results as well as molecular epidemiologic investigation. Guidelines for the prevention and control of antibiotic resistant organisms (ARDs) can be found online at http://www.gov.mb.ca/health/publichealth/cdc/fs/aro.pdf.

In outbreaks where the Manitoba Provincial Outbreak Response Plan (ORP) is activated, CPL will usually be a participant on the team.

Details of pathogen specific outbreak response protocols may be found in the Manitoba Health Communicable Disease Management Protocol Manual, available online at http://www/gov.mb.ca/health/publichealth/cdc/protocol/.

1. Heymann, David L. (Editor). *Control of Communicable Diseases Manual, 18th Edition.* American Public Health Association, Washington DC, 2004.

SEXUAL ASSAULT PROTOCOL

CPL is the laboratory-co-ordinating site for the investigation of infectious diseases transmitted during sexual assault.

Consult with local/regional protocols for detailed procedures.

The following infectious agents may be considered in the investigation of sexual assault:

HIV
HBV
HCV
Chlamydia
Gonorrhea
HSV
HAV
(others, depending on circumstances)

In all cases, investigating practitioners must take precautions to definitively label each requisition and patient specimen container with the patient name, PHIN, date and site of collection. Requisitions must also be labeled:

SEXUAL ASSAULT

Specimens/requisitions not labeled as above may be rejected or discarded within two months of testing, limiting evidence available to establish transmission of infection.

Requisitions may be folded to protect the patient's identity and privacy.

Delivery should follow a chain-of-custody protocol.

NOTE: The abbreviations 'S.A.' or 'SAP' are not acceptable.

NEEDLESTICK INJURY PROTOCOL

Please see the Manitoba Health's Integrated Post-Exposure Protocol located at www.gov.mb.ca/health/publichealth/cdc/protocol/hiv_postexp.pdf.

There is a small window of time available to exposed individuals to optimize their chances of preventing HIV or HBV transmission after needlestick injury. HIV, HBV and HCV related testing can be conducted on a STAT basis if required. This requires co-ordination with CPL.

Weekdays - tests performed on specimens received before 1430 hours.

Same-day testing - advise source laboratory to transport specimen to CPL STAT to ensure sample arrives at CPL before 1430 hrs. It is best to consult with CPL to ensure the specimen is recognized and processed in a timely fashion.

Weekend or after hours testing - if required, call CPL Security at 945-6655 to page physician on-call.

Calling for results - provide patient name, and one other unique identifier, i.e., PHIN.
- for non-nominal HIV Ab results, provide HIV requisition number and patient code.

Note: A requisition with the appropriate information and clearly marked STAT (a coloured sticker is **mandatory**) must accompany the specimen.

1.0 TECHNICAL SUPPORT SERVICES

The Technical Support Services Section is responsible for:

- Quality Control (QC) for CPL.
- verification of all diagnostic kits and microbial identification systems for CPL.
- media preparation and QC.
- co-ordination of CPL's accreditation program and Internal and External Proficiency Testing Programs
- specimen receiving and processing, mail room services, and wash-up / sterilization.
- sterilizer testing for CPL, Body Modification establishments and dental offices.

1.1 SPECIMEN SUBMISSION REQUIREMENTS

Specimens collected and transported to CPL require the following information:

1.1.1 REQUISITION REQUIREMENTS

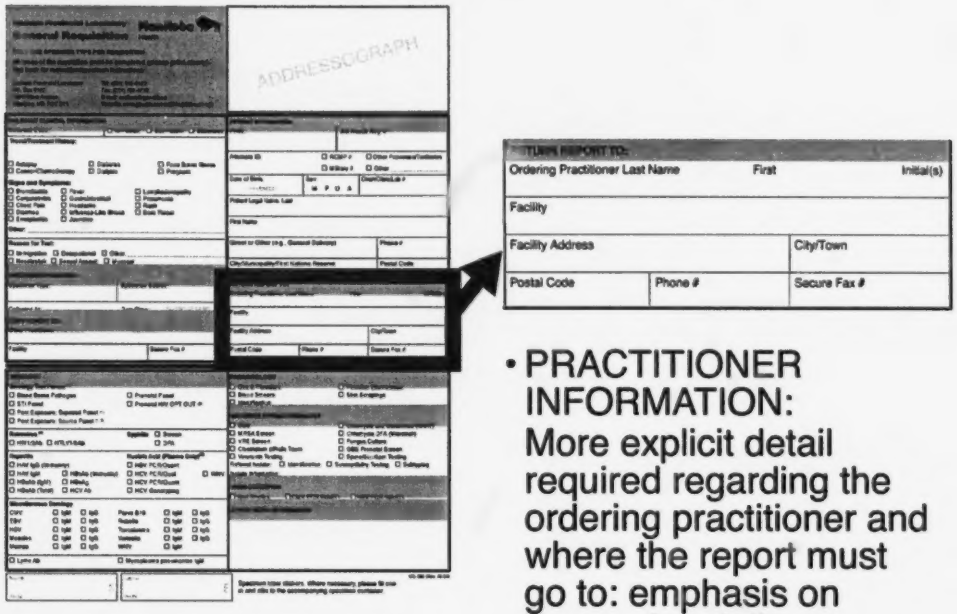
Each clinical specimen must have its own CPL requisition.

Patient Information (**Mandatory**)

1. Patient surname, given name.
2. Patient address (street and number), city/town, postal code.
3. Personal Health Identification Number (PHIN); if no PHIN use MB Health number or unique organizational identifier (for out-of-province), etc.
4. Date of birth.
5. Gender.

Ordering Practitioner's Information (**Mandatory**)

6. Ordering practitioner's last name, first name or first initial (full name preferred).
7. Ordering practitioner's reporting address (street and number), city/town, postal code.
8. Ordering practitioner's phone number.
9. Secure fax number.



- PRACTITIONER INFORMATION: More explicit detail required regarding the ordering practitioner and where the report must go to: emphasis on secure fax delivery

Specimen Information

10. The source and type of specimen (**mandatory**).
11. Specimen collection date and time.
12. Facility where specimen collected.
13. Requested test(s) or procedure(s).
14. Medical/Clinical information (symptoms, history, diagnosis, risk factors, etc.).
15. For referral isolates, suspected organism and previous identification test results are required.

1.1.2 SPECIMEN LABELING REQUIREMENTS (SPECIFIED ON THE CONTAINER) (MANDATORY)

- Patient's surname and given name.
- As well as one other unique identifier, i.e., PHIN, DOB; PHIN is preferred.
- Collection date and time (where appropriate).
- For non-nominal HIV or Retrovirus specimens, use the patient code and requisition number as the two unique identifiers.

If specimens are received at CPL that are inappropriately labeled or packaged, the sender will be notified by report. Repeat errors will result in non-processing of specimens.

1.3 PACKAGING AND TRANSPORT OF SPECIMENS

All specimens submitted to the laboratory for testing must be packaged in such a manner as to prevent the spillage, breakage, or damage to the specimen itself, and/or to accompanying specimens. The safety of the environment, and the safety of all persons involved in the shipping, handling and receiving of these specimens must be ensured by preventing exposure to the contents of the shipment at any time.

In Canada, the Transport of Dangerous Goods Act regulates how dangerous goods, (including Class 6.2 Infectious Substances) may be transported.

Infectious substances are substances which are known or are reasonably expected to contain pathogens. Pathogens are viable micro-organisms, including but not limited to bacterium, virus, rickettsia, parasites or fungus, or a recombinant, hybrid or mutant thereof, that are known or reasonably believed to cause disease in humans or animals. These substances fall into two categories:

- Category A
- Category B

Category A specimens are assigned to two classes: *UN 2814 Infectious Substances (affecting humans)* or *UN 2900 Infectious Substances (affecting animals)*. To be classified as a Category A specimen, the infectious substance is in a form that when exposure to it occurs, is capable of causing permanent disability, life-threatening or fatal disease in otherwise healthy humans or animals.

Category B specimens are generally classified as an infectious substance which does not meet the criteria for inclusion in Category A. Specimens are assigned to *UN 3373, Biological Substances, Category B.*

Exempt Human Specimen designation refers to patient specimens with a minimal likelihood of having pathogens present. To determine if a patient specimen qualifies for exempt status, the submitters must use professional judgement based on known medical history, symptoms and individual circumstances of the source and endemic local conditions. This exemption does not include any patient specimens being tested for pathogens. If you are shipping Category B and Exempt Human/Animal Specimen samples in the same package, the samples are shipped using the packing with the highest risk.

Refer to Blue Box Packaging Directions and CPL Exempt Human and Infectious Substance Transport Guidelines (see section 8.0) and consult the International Air Transport Association (IATA) for the air list of infectious substances and the Canadian Transportation of Dangerous Goods Act and Regulations for the road list.

1.4 TRANSPORTING SPECIMENS TO CPL

Refer to Blue Box Packaging Directions in Section 8.0.

- All specimens should be shipped by bus, courier or air, whichever is the fastest.
- Specimens sent by bus are picked up at the Winnipeg Bus Depot at 7:45 a.m. and 11:45 a.m. Monday through Friday, and 10:00 a.m., Saturday and Sunday. Urgent specimens may be picked up at other times by prior arrangements. Please call (204) 945-6805 prior to sending urgent specimens.
- Only where bus or other transport is not available should diagnostic specimens be sent via Priority Post. **Specimens must never be sent through the regular mail.**
- All specimens must be clearly labeled and the requisition completely and appropriately filled out.
- Frozen specimen packing should contain sufficient dry ice or frozen gel packs for package contents and distance traveled to maintain specimen integrity.
- Cold, not frozen, gel packs should be used on top or between specimen bags for refrigerated specimens.
- Because of possible contamination, gel packs will be discarded if not received in press and seal bag.
- Ship specimens with similar temperature requirements in the same shipping container.
- Probable Level III and Level IV organisms are to be telephoned in before delivery to CPL at (204) 945-6805
- Level III and Level IV organisms should only be shipped during regular business hours and not on weekends
- If a specimen needs to be shipped after hours or on the weekend or holidays, please follow the call back procedure under General Guide to Laboratory Use section of this Guide.

1.5 TRANSPORT SUPPLIES

CPL will provide the following kits/supplies for the collection and transportation of specimens. Orders for supplies are to be sent to CPL via fax at 786-4770. Supply order forms are available on our website at www.gov.mb.ca/health/publichealth/cpl/forms. Only in emergent situations should this request be telephoned.

DESCRIPTION	UNIT OF ISSUE
Forms	
Address Labels - White	Role of 250
General Requisition	Each
HIV Requisitions - General	Pkg. of 25
HIV Requisitions - Viral Load, for specialists or HIV caregivers only	Pkg. of 25
Maternal Serum Screening (MSS) Requisition	Each
Newborn Screening Specimen Collection Card	Each
Newborn Information Pamphlet	Each
Reagents	
VTM	2 mL vial
SAF Stool Preservative	1 litre bottle – MSDS will be supplied
Gram's Crystal Violet	1 litre bottle
Gram's Safranine	1 litre bottle
Gram's Iodine	1 litre bottle
Decolorizer 50/50	1 litre bottle
10% KOH 10 mL	25 mL bottle
40% KOH 40 mL	50 mL bottle
Kovac's	50 mL bottle
Ehrlich's	50 mL bottle
10% Ferric Chloride	50 mL bottle
2SP Chlamydia Transport Media	2 mL vial (special request)
Swabs/Kits	
Amies Charcoal Transport	Bag of 50 or each
Dacron Swabs	Each (special request)
Chlamydia/GC GenProbe Aptima:	
Unisex Swab Collection Kit	Box of 50 or each
Urine Collection Kit	Box of 50 or each
Flocked Swabs (adult or pediatric)	Each
Micro Trak	Box of 20 or each
Polyester Tipped Swabs with Ultrafine Aluminum Shaft	Each

Most other general lab supplies are available from Materials Distribution Agency - 945-6040; www.mda.gov.mb.ca (check under Medical Catalogue).

1.6 TRANSPORT MEDIA (TM)

MEDIA	APPEARANCE	USE	STORAGE
Amies Charcoal TM (with swab)	Black	General T.M. suitable for routine bacterial cultures and sensitivities, especially good for sensitive pathogens *(B. pertussis, N. gonorrhoeae).* Substitute nasopharyngeal swab for included swab where necessary (e.g., pertussis).	Store at room temperature. Do not freeze. Observe expiry date on package
STI Collection Kits for Chlamydia and Gonorrhea	Clear Diluent	A rapid NAAT for detection of *N. gonorrhoeae* and *Chlamydia trachomatis* from endocervical, urethral and urine specimens.	Store at 2ºC-30ºC until expiration date on the kit. After specimen collection store at 2ºC-30°C. Do not discard swab or buffer.
Sodium Acetate, Acetic Acid, Formalin **(SAF)** (Parasitology)	Clear no precipitate	2 parts SAF and 1 part stool - thoroughly emulsified at time of collection	Store at room temperature.
Viral Transport Media **(VTM)**	Clear, straw color	T.M. for swabs, tissues and aspirates requiring viral culture. Not suitable for blood, CSF, urine or stool.	Store frozen at -20°C for up to 12 weeks; 4°C for 1 week. If it is thawed during shipping, it should be refrozen at the earliest opportunity, and may be used for 6 weeks. After collection of specimen, transport to CPL ASAP at 4°C with a cold pack.
2SP Chlamydia Transport Media (Special Request)	Clear	TM for swab (must use Dacron swab) specimens requiring PCR for LGV, Haemophilis ducreyi, Chlamydophila pneumoniae or Chlamydophila psittaci, or for suspect antibiotic resistant C. trachomatis	Store frozen at -20°C until used – observe expiry date on vial. After specimen collection, transport to CPL at 4°C.

1.7 TRANS-SHIPPING OF SPECIMENS BY CPL

In order for CPL to ensure specimens are trans-shipped and received at the appropriate testing site, the appropriate requisition must be completed accurately with the result reporting information (name and location where report is to be sent) clearly visible.

Referrals to the National Microbiology Laboratory (NML) must be processed through CPL.

2.0 CLINICAL MICROBIOLOGY

Clinical Microbiology services involve the detection, isolation and epidemiological characterization of bacterial or fungal pathogens or toxins from clinical specimens. Procedures include, but are not limited to:

- isolation using enriched and selective culture media
- pathogen identification and characterization by biochemical, serological, microscopic and molecular techniques
- antimicrobial susceptibility testing
- toxin testing

The sub-sections include:

- Enteric bacteriology - enhanced foodborne-illness investigation and detection of enteric pathogens.
- Sexually transmitted infections - detection of *Chlamydia trachomatis, Neisseria gonorrhoeae,* and other sexually transmitted microorganisms.
- Respiratory – detection of *Bordetella pertussis, Legionella* spp., *Corynebacterium diphtheriae,* and other microorganisms.
- Mycology - isolation and identification of yeasts, dimorphic fungi, dermatophytes and some medically significant molds.
- Toxins - detection of verotoxins and *Clostridium difficile* toxins.
- Emerging antimicrobial resistance – screening, detection and characterization of current and emerging antibiotic resistance in organisms such as *Staphylococcus aureus* and *Enterococcus* spp.
- Miscellaneous bacteriology - isolation and identification of pathogens from a variety of clinical specimens and referred-in isolates.
- Molecular typing - molecular typing of bacterial pathogens.

Service Hours:

Clinical Microbiology provides 7-day service, with some limitations on weekends and statutory holidays. Emergency on-call service is by special arrangement only and must be authorized by the Director or designate.

Clinical Microbiology programs:

These include, but are not limited to:

- Enteric program including enteropathogenic *Escherichia coli* and provincial screening for verotoxins
- Outbreak and food-borne illness investigation
- Provincial STI screening for chlamydia and gonorrhea
- Prenatal screening for Group B *Streptococcus*
- Respiratory program including Diphtheria toxigenicity, Pertussis and Legionella

- Emerging resistance screening - e.g. MRSA, VRE, Carbapenemases
- Molecular diagnostics and epidemiology
- Support of the Provincial Mycobacteriology Program
- Provincial public health reference service
- Laboratory-based surveillance

Referred out services

- Acts as an intermediary for referring of isolates or specimens to the National Microbiology Laboratory, National Reference Centres, or other appropriate referral and reference laboratories.

Other services

- Development of and participation in externally and internally funded microbiology research projects.
- Participation in University of Manitoba under-graduate and graduate medical education programs.
- Inservices for Medical Laboratory Technology students, Cadham Provincial Laboratory staff, and public health nurses.
- Participation provincially and nationally on issues of public health laboratory and program importance.
- Education and research.

Note: This is a general description of services and not meant to be exclusive.

2.1 SPECIMEN COLLECTION

The following is a review of the steps necessary to secure the optimal sample for culture.

Note: Sterile gloves should be worn whenever specimens are collected.

Standard Skin Antisepsis (best method) for obtaining blood and body fluid specimens:

- After palpation, scrub the site with 70% ALC for a minimum of 30 seconds.
- Apply TI to the area, allowing contact for at least 2 minutes. Let air dry (do not blow).
- Remove the TI with ALC using increasing outward circular movement (2 minutes).
- For superficial lesions such as abscesses and bullae, a gentle disinfection with ALC, allowed to dry, is sufficient.

2.1.1 ABSCESSES

1. Prepare the surface as per Standard Skin Antisepsis.
2. Aspirate at least 0.5 ml and preferably 1.0 ml of purulent material.
3. Send the specimen immediately to the laboratory. If delay in transportation is anticipated, inject 1.0 ml or more of pus into blood culture medium.
4. Swabs of pus must be placed into transport medium, because of the tendency to dry.
5. Do not freeze. Keep swabs at room temperature (25°C) or 4°C and fluids at room temperature.
6. Expel contents of syringe into sterile screw-capped container.
7. Submitting the contents in a syringe is not recommended. If absolutely unavoidable, remove the needle and cap and replace with the sterile cap provided. Tape the plunger to avoid spillage.

2.1.2 BLOOD FOR CULTURE

Blood culturing is no longer available and should be sent directly to laboratories providing this service.

Special blood culture medium is required for the isolation of mycobacterium. Contact the TB Laboratory at Health Sciences Centre. Telephone: (204) 787-7652.

2.1.3 BODY FLUIDS (EXCEPT URINE AND CEREBROSPINAL FLUID)

1. Prepare the surface as per Standard Skin Antisepsis (See Section 2.1).
2. Use sterile needle and syringe.
3. Handle all specimens so as to ensure viability of potential anaerobic pathogens, i.e., collection into blood culture bottle or an anaerobic transport vial.
4. Send 5 to 10 mL to the laboratory. It is best to transport such specimens immediately to the laboratory, not only to maximize appropriate processing, but to ensure prompt results from immediately available laboratory procedures.

5. Where a delay in processing is anticipated, inject 1 mL into a blood culture bottle and make a smear by spreading one drop of fluid in the center of a clean microscope slide. The smear should be allowed to dry in air and then be fixed over heat. Any remaining fluid should be submitted along with the smear and the inoculated blood culture bottle (25°C).
6. When clotting is anticipated, dilute the sample with sterile saline.
7. Do NOT refrigerate or freeze samples, keep them at room temperature (25°C).

2.1.4 BULLAE, CELLULITIS, PETECHIAE, VESICLES

1. Prepare the surface as per Standard Skin Antisepsis (See Section 2.1). In the case of bullae and vesicles, care is exercised to avoid lesion rupture.
2. A sterile needle and syringe are used.
3. As much material as feasible is aspirated, and placed in appropriate transport media (bacterial or viral).
4. If no aspirate is available, non-bacteriostatic sterile saline may be injected and aspirated. It is best to attempt this at lesion edges.
5. Petechiae pose special problems, and some prefer excoriation of the skin with a needle tip after vigorous cleansing. In this event, TI should be removed with ALC prior to this exercise. A swab is then used to immediately inoculate chocolate agar plates at the bedside or to put material on a slide for Gram stain.
6. One half of one mL of sterile saline may be injected into the advancing edge of a cellulitis and subsequently aspirated. The aspirate may then be injected into a blood culture medium.
7. Collect at least 0.5 mL, preferably 1.0 mL or more.
8. Do NOT freeze, keep at 4°C.

2.1.5 CEREBROSPINAL FLUID

1. The physician wears sterile gloves, a gown, and a mask.
2. Prepare the surface as per Standard Skin Antisepsis (See Section 2.1).
3. Drape the surrounding skin with sterile linen.
4. In adults, a needle insertion is ideally followed by collection of more than 2 mL of cerebrospinal fluid (CSF) into a sterile container for which a leakproof cap is available.
5. Ideally separate tubes are used to collect specimens for a cell count and biochemical analysis.
6. Transport the specimen immediately to the laboratory, as the organisms likely to be isolated are fastidious.

7. Where a delay in processing is anticipated, inject 1 mL into a blood culture bottle and make a smear by spreading one drop of fluid in the center of a clean microscope slide. The smear should be allowed to dry in air. Any remaining fluid should be submitted along with the smear and the blood culture bottle.
8. Store at 35°C or at room temperature (25°C).

2.1.6 CERVIX AND ENDOMETRIUM

1. The patient is placed in the lithotomy position.
2. A speculum is inserted and the cervix is visualized. Excess mucus is removed with a cotton ball or a swab, before the specimen is collected.
3. For cervical cultures, the swab is inserted in the distal portion of the cervical os, and allowed to remain for 10 to 30 seconds. Specimens for chlamydial studies are taken as above, but require rotation of the swab to obtain the superficial layer of cells required for testing.
4. Endometrial cultures should be approached either by needle aspiration or by a double lumen catheter through the cervical os. A slight cut has been previously made in the advancing end of the catheter to allow egress of a number 8 infant feeding tube, which is fed through the lumen of the Foley catheter to obviate normal flora contamination.
5. Place swab in charcoal transport medium for C&S; place chlamydial/GC swab in GenProbe container (see section 2.2).
6. Do NOT freeze or refrigerate.
7. Store at room temperature (25°C).
8. Send as quickly as possible (within 48 hours for C&S).

Note: Only aspirated material is considered to be useful for anaerobic culture. Additional information on other collection kits is provided under the STI Bacteriology and Virology entries, see index.

2.1.7 CONJUNCTIVA

1. Premoisten sterile swab with sterile saline and obtain secretions from inner aspect of eyelid.
2. Transport in charcoal transport medium.
3. For Chlamydia testing, see section 2.2.

2.1.8 NASOPHARYNX

1. The patient is comfortably seated, preferably with the head tilted back.
2. A nasal speculum is gently inserted.
3. A nasopharyngeal swab, on a malleable wire with a Teflon coated non-toxic tip, is inserted parallel to the palate through the speculum into the nasopharyngeal area.
4. The swab is rotated gently and allowed to remain for 20 to 30 seconds. The swab is then removed and placed in transport medium.
5. It is important to stress the use of charcoal transport medium with these specimens because the swab tip is small and vulnerable to drying and the organisms likely to be present are rather fastidious.
6. The specimens should be transported promptly to the laboratory.
7. Store at room temperature (25°C).
8. Do NOT freeze or refrigerate.

2.1.9 NOSE

1. Anterior nares cultures are easily taken with a regular Dacron swab. In small children this is best done with a swab such as described in section 2.1.8.
2. Place swab in Ames charcoal transport medium and send to CPL immediately.
3. Store at 25°C (room temperature).

2.1.10 PUS

1. Aspirate a minimum of 0.5 mL by sterile syringe, if possible, and submit in sterile tube and/or on a swab well-soaked in pus. Send swab in transport medium.
2. To make thin smears, use the swab or by pressing a small spot of pus between two slides and then sliding them apart. Dry in air. Place slides in cardboard slide-mailer and secure with an elastic band.
3. For anaerobic culture, inject pus or other material into a blood culture tube, or into an anaerobic transport system.
4. Store at 25°C (room temperature).

2.1.11 SKIN

1. See also sections: abscesses; bullae, cellulitis, petechiae, vesicles and wounds.
2. For fungi: Cleanse with ALC, scrape the advancing edge of the infected tissue and collect scrapings in dark paper, folded and properly packaged. Keep specimen dry. Do NOT place in transport medium.

2.1.12 SPUTUM

1. Sputum is a very poor specimen unless patient co-operation is assured and unless special laboratory assessment is performed to determine adequacy of the specimen based on the numbers of squamous epithelial cells and leukocytes. Even optimal specimens fail to indicate the causal agent of pneumonia in up to 90% of cases.
2. The patient should be properly instructed as to what is desired. Early morning sputa from the lungs after rinsing the mouth out with water and gargling; removal of dentures and plates is desired. Keep the amount of saliva in the specimen to a minimum. A sterile wide-mouthed, screw capped, leak proof container is provided for the expectorated material.
3. If the patient is unable to produce sputum, induction may be effected by postural drainage, saline nebulization, or chest percussion. Please inform the laboratory by notation on the requisition when this type of a specimen is obtained. Otherwise, it may be mistaken for saliva, and be rejected.
4. Since some of the organisms are fastidious, the specimen should be transported promptly to the laboratory.
5. In infants, tracheal secretions should be submitted.
6. Collect at least 1.0 mL of sputum, but no more than 30 mL.
7. Store at 4°C. Do not freeze or use preservatives.

2.1.13 STOOL, FECES, RECTAL

1. From a clean, urine-free receptacle, transfer stool into a sterile screw-capped container, until at least one-third full and no more than one-half full. Transport promptly.
2. Rectal swab is the specimen of choice for VRE and ESBL, and a suitable alternative for Shigella. Insert sterile swab 1 inch into the anal canal so that feces is evident on the swab. Transport in charcoal transport medium.
3. For C&S, toxin testing or FBI investigation, store at 4°C.
4. Keep from freezing or leaking.

5. If unusual pathogens are suspected (i.e. *Vibrio cholerae, Yersinia,* or *Plesiomonas shigelloides*), please indicate this on the requisition. Also indicate whether C&S, C. difficile toxin, or verotoxin testing is desired.

2.1.14 THROAT

1. In adults, a rayon swab is used with good visualization (use a tongue blade and a good light source). Vigorously swab both tonsillar fauces and the posterior pharynx, reaching up behind the uvula and culturing an ulceration, exudate, lesion or area of inflammation. Place in charcoal transport medium.
2. Store at room temperature (25°C) or 4°C.
3. Submit within 24-48 hours.
4. Indicate on requisition if diphtheria or gonorrhea is suspected.

2.1.15 TRANSTRACHEAL ASPIRATE

1. This technique is not a routine culture technique and is best done by an experienced individual.
2. Submit specimens in a blood culture media tube or anaerobic transport system, in order to preserve possible anaerobes.
3. Collect at least 0.5 mL, preferably more, in a sterile container.
4. Store at 4°C.
5. Do NOT freeze.

2.1.16 VAGINA

1. Wipe away excessive secretions; obtain secretions from mucosal membrane of the vaginal vault with sterile transport swab.
2. Intrauterine device may be sent in a sterile container; transport within 24 hours at room temperature (25°C).
3. Vaginal or vaginal-rectal swabs for Group B Streptococcus should be collected at 35-37 weeks gestation.

2.1.17 URETHRA

1. Use a sterile bacteriologic wire or disposable plastic loop to obtain the specimen from the anterior urethra by gently scraping the mucosa. An alternative to the loop is a sterile rayon urethral swab that is easily inserted into the urethra.
2. Transport of these cultures are as described for cervix and endometrium (see section 2.1.6).
3. For Chlamydia / GC testing, see section 2.2.

2.1.18 MID-STREAM URINE

1. It is best to obtain early morning specimens whenever possible. The urine of patients who are receiving forced fluids may be sufficiently diluted to reduce the colony count below 10^8 per L.
2. A properly collected mid-stream urine is ideal. An intermittently inserted catheter or suprapubic aspirate is also appropriate. Always use sterile containers.
3. Collect a mid-stream urine as follows: Clean area thoroughly with soap and water and rinse with wet gauze pads; holding the labia apart or the foreskin retracted, begin voiding; after several ml have passed, collect sample without stopping flow.
4. Urine culture - inoculate a urine dip slide with the collected urine as follows: Dip agar slide into the freshly collected urine, allow to drain, replace in container, screw lid tightly. NOTE: Actual urine for culture will not be processed unless the urine arrives at CPL before 4:30 p.m. on the day of the collection.
5. Urine for chlamydia - see Chlamydia in section 2.2.2.
6. Urine for *Legionella* Antigen - see Legionnaires disease in section 7.0.

2.1.19 WOUNDS

1. For the closed wound technique, see sections abscesses, bullae, cellulitis, petechiae and vesicles (2.1.1 and 2.1.4).
2. For open wounds:
   a) Clean the sinus tract opening or the wound surface with normal saline.
   b) These areas frequently yield "normal flora" organisms. Therefore, it is important to attempt to culture the base or edges of the wound.
   c) Swab specimens of sinus tracts may be acceptable, but aspiration material obtained by needle or catheterization is preferable. Curettings obtained from the lining of the sinus tract also provide excellent culture material. For ulcerations or open wounds, curettings or biopsy specimens are best. These are placed into a sterile transport container. Tissue or aspirated material provides the greatest yield. Do not freeze. Keep at room temperature (25°C). Transport ASAP.

2.2 STI BACTERIOLOGY

2.2.1 GONORRHEA

Collection

1. See section on cervical specimens (see section 2.1.6).

2. A rectal swab can be obtained without an anoscope, by inserting a dacron swab approximately 1 inch into the anal canal. The swab is then moved from side to side to sample the crypts and left for 10 to 30 seconds to allow absorption of organisms onto the swab.

3. In the male, urethral culture is usually obtained either with a rayon swab or a plastic loop (see section 2.1.17). Both smear for gram stain and culture are indicated.

4. Throat swabs are occasionally helpful in the diagnosis of gonorrhea, but vaginal swabs generally have a poor yield of positive results.

5. Urine NAAT is available routinely for males, females without a cervix (due to hysterectomy), or those refusing a complete examination. See section 2.2.2 Chlamydia for information on collection and transportation of specimens.

Note: Culture for this organism is useful when the specimen can be processed in the laboratory within 24 hours of procurement. It is one way of detecting in the cervix, urethra or eye and the only satisfactory way at present for detection from other sites, i.e. throat, vagina or rectum.

Note: If purulent material is present in the urethra or if other lesions are present these should be cultured, in addition to the cervix.

Adults
A swab in Amies charcoal transport medium from anus, throat, eye, vagina, cervix or urethra for culture, where culture can be started same day. Dry swabs are unsuitable.
or
NAAT kits (Aptima unisex swab collection kit for endocervical and urethral specimens and Aptima urine specimen collection kit); follow manufacturer's instructions. **Use NAAT where any delay in testing is anticipated.** Use only the swab provided in the NAAT kit, any other type of swab will not be processed. The same kit can also be used for Chlamydia detection. Be sure to leave the extraction fluid in the tube supplied.

Prepubertal Children
Culture is as above, irrespective of length of delay of processing. Unfortunately many *N. gonorrhoeae* infections will be missed if delay is greater than 24 hours. A smear should accompany these specimens. (One streak about 0.5-1.0 inch or 1.5-2.0 cm long is made on a clear glass slide. Air dry). Vaginal swabs in Amies charcoal TM are suitable samples from prepubertal females, but must be cultured.

Conjunctivitis in Newborn
A swab for culture in Amies charcoal TM should be taken. If submitted for NAAT, results will be reported as "for investigational purposes only."
A smear should be submitted.

2.2.2 CHLAMYDIA

Collection
See section on cervical swabs (section 2.1.6) and urethral swabs (section 2.1.17). For urine specimens patient should not have urinated one hour prior to collection. The first 20-30 mL (NOT midstream) should be collected into a sterile plastic preservative-free container, then transferred to the Aptima urine specimen transport tube ASAP. Store at 2ºC-30°C until transportation to CPL is available.

Tests Available
The two detection methods readily available at CPL are:
1. NAAT used for urines from males, cervical and urethral specimens.
2. Direct fluorescent antibody (Microtrak) used for all other specimens (e.g. throat, rectal, nasopharyngeal).

Adults
Collect a cervical swab using the GenProbe Aptima unisex swab collection kit from adult and legally consenting adolescent females.

Collect first void urine (not mid-stream) using Aptima urine collection kit only on those females without a cervix (due to hysterectomy) or those refusing a complete examination.

Collect first void urine (recommended) or a urethral swab using the GenProbe Aptima unisex swab collection kit or Aptima urine collection kit from males.

All other sites (throat, anus) require fluorescent antibody testing (Microtrak). If Microtrak kits are not available, make a smear approximately 1/4 inch (10 mm) in diameter on a clean glass slide and air dry.

See manufacturer's instructions (GenProbe Aptima or Microtrak) for handling swabs, urines and slides.

Prepubertal Children
For vaginal and urethral sites, NAAT testing is preferred; Microtrak testing is acceptable but not preferred. For all other sites, e.g. throat, rectal, etc., Microtrak testing is appropriate. First void (not midstream) urine may also be collected. **Please indicate boldly on requisition that these specimens are from young children.**

Eyes
Eyes can be tested using Microtrak testing or NAAT. Results for eyes tested by NAAT will be reported as "for investigational purposes only."

Newborn
Pulmonary, tracheal secretions and nasopharyngeal aspirates should be submitted in sterile containers. When in doubt as to procedure please phone for advice (945-7204).

2.3 REFERENCE MICROBIOLOGY

Cadham Provincial Laboratory provides a range of specialized reference activities which may assist in the identification or typing of microbes isolated in other clinical laboratories. Material to be examined must be submitted in pure culture in an acceptable manner, bacterial or fungal cultures being on slants of appropriate medium in a tightly capped or stoppered small bottle or stoutly constructed tube. Suspect level 3 organisms should be appropriately packaged and labelled (see section 1.3) with phoned notification to CPL prior to shipping.

It is essential that the following details accompany the material to be examined: details of the original specimen, the illness being investigated, and results of tests already performed in the submitting laboratory. See Section 1.1.1 for general requisition requirements.

The services offered include:

1. Toxin testing
2. Serotyping
3. Biotyping
4. Molecular typing
5. Nucleic acid amplification techniques (NAAT)

Specimens submitted for tests that are not performed at CPL will be forwarded to an appropriate reference laboratory. Some delay may be expected when this occurs. Acknowledgement is always given when the Laboratory reports results of tests performed elsewhere. E.g., Streptococcal Serotyping, *Clostridium botulinum* I.D., *Chlamydophila pneumoniae* I.D., Mycoplasma and Ureaplasma Culture or PCR.

A variety of molecular diagnostic and molecular typing techniques are utilized in the Molecular division of the Clinical Microbiology section of CPL. These tests are typically based on methods developed by other laboratories. The protocols for these methods have either been provided directly by these laboratories or have been published in the peer-reviewed literature and validated in-house prior to being put in service. Any clients of CPL who require more detailed information on these tests (e.g., primer sequences used, PCR reaction conditions) should phone the Scientist in the Clinical Microbiology section for further information.

2.4 ANTIBIOTIC SUSCEPTIBILITY TESTING

1. Antibiotic susceptibility tests are done routinely only on organisms considered to be significant. If testing with particular antibacterial agents is desired, the request should be clearly noted on the requisition. It is not practical to test every available antibiotic.

   Routine susceptibility tests are not needed when resistance has not been described to the antibiotic of choice (e.g. *Streptococcus pyogenes* to penicillin).

2. Determination of the concentration of antibiotics in blood or other specimens may be arranged in consultation with the Laboratory.

2.5 REPORTING

Results are sent out by fax or mail. Positive test results which are likely to be required with urgency by the physician are telephoned with hard copy results to follow. Refer to the "Alert/Critical Results Call Practice" in the General Guide to Laboratory Use section.

2.6 CLINICAL MICROBIOLOGY TURNAROUND TIMES

Turnaround time is dependent on a variety of factors including:
- purity of submitted isolate
- fastidiousness and growth requirements of organism
- unusual phenotypic traits of the isolate
- complexity of testing methods required for workup
- amount of isolate information provided by the submitting laboratory

General Turnaround Time for a Positive Culture

- **Bacterial cultures and yeasts** - rapidly growing cultures can often be identified after overnight incubation, and preliminary results may be available within 24 hours of receipt of specimen.

- **Antibiotic susceptibility tests** - 48 hours (the organism must be isolated in culture before being tested).

- **Fungi, culture and identification** - 2 to 3 weeks for hair, skin and nail infections; 2 to 6 weeks for others.

  Note: Referral to reference centres will increase turnaround time.

Laboratory Tests	Minimum Turnaround Time For A Negative Test (working days)
Actinomyces request	8 days
Anaerobic Culture – miscellaneous specimen	3 days
C. difficile culture & toxin (colon tissue)	5 days
C. difficile toxin (stool)	5 days for tissue culture/same day for rapid test
Chlamydia (NAAT)	2 days
Chlamydia DFA	2 days
Diphtheria Culture	3 days
Diphtheria Toxigenicity	4 days
Direct Microscopy	24 hrs. or same day
Ear C&S	2 days
ESBL Screen	2 days
GC (NAAT)	2 days
GC Culture	3 days
Genital C&S	2–3 days
Helicobacter pylori Culture	8 days
Legionella Antigen Detection	24 hrs. or same day
Legionella Culture	15 days
Miscellaneous Specimen (wound, ulcer, skin)	3 days
MRSA Screen	2 days
Mycology Culture – CSF	42 days
Mycology Culture – routine specimen, not CSF	21 days
Peritoneal dialysate fluid C&S	6 days
Pertussis Culture	8 days
Sputum C&S	2 days
Stool C&S	3 days
Stool FBI	3 days
Throat, Nasal, Mouth C&S	2 days
Verotoxin	3 days
VRE Screen	2 days

3.0 SEROLOGY-PARASITOLOGY

Serological tests involve the detection and determination of antigen or antibody using a variety of laboratory procedures.

The Serology Section performs procedures for:

- Screening and diagnostic purposes - To detect acute or chronic infections due to viral, bacterial, fungal or parasitic agents.
- Immune Status Assessment - To detect past exposure or to evaluate response to immunization.
- Quantitative and qualitative testing of viral agents.
- Comprehensive Parasitology testing.
- Molecular-based typing and detection.
- Viral load and genotyping for patient management and surveillance purposes.
- Outbreak support.

Serology Programs

- Prenatal screening program includes Rubella, HBsAg, Syphilis testing. It is recommended that all expectant women be tested for HIV.
- Manitoba Bone Marrow Transplant Program for donors and recipients.
- Organ donor and eye bank donor screening.
- Dialysis Program consists of regular screening of all dialysis patients for hepatitis and HIV if requested.
- Sentinel surveillance for vector-borne diseases such as Western Equine Encephalitis.
- Outbreak support services.

Referred out Services

- The Serology Section acts as an intermediary for the referral of specimens to appropriate serology and molecular reference centres.

Emergency On-Call Service (Paging system)

Serology provides 24-hour call back service. Call 945-6655 and the on-site Security Guard will refer the call to the medical staff on call. Emergency Needlestick exposure testing at the approval of CPL Physician. Most after-hour STAT requests must be authorized through the 'on-call' physician. The only exception is organ donor transplant screening serology.

Note: This is a general description of services and not meant to be exclusive.

3.1 SEROLOGY TESTS

Serological tests involve the detection and quantification of specific antibody or antigen titers, using a variety of laboratory procedures. These procedures may be used for:

- **Screening or diagnostic** - To detect acute or chronic infections due to viral, bacterial, fungal or parasitic agents (IgM specific antibody is associated with acute phase of illness).
- **Immune Status Assessment** - To detect past exposure or to evaluate response to immunization (IgG antibody).
- **Prenatal testing** includes HBsAg, Rubella, Syphilis and HIV (HIV opt-out available) tests. Additional tests may be specifically requested (e.g., toxoplasmosis, Varicella Zoster).
- **Quantitative Testing of Viral Agents** - to monitor response to/or direct therapy.
- **Viral Genotyping** - as part of an epidemiologic investigation or patient management.
- **Hepatitis** - Indicate clinical condition or reason for requesting the test.
- **Post-exposure protocol** - Follow instructions developed by Manitoba Public Health at: www.gov.mb.ca/health/publichealth/cdc or telephone 788-6722 during work hours, or 945-0183 after hours and on holidays/weekends.
- **Molecular** - Molecular biology techniques are used to meet the growing demands of the medical community to develop quantitative and qualitative assays to assist in patient management. NOTE: For tests not performed locally, samples will be referred to a reference laboratory. Referral institution is always indicated on the report.
- Refer to website www.gov.mb.ca/health/publichealth/cpl/forms for General Requisition (back) for description of test panels.

<u>Requisition requirements for Hepatitis B testing</u>

There are several different protocols for appropriately testing for HBV, each depending on the clinical scenario. It is therefore, extremely important to include patient clinical information on the requisition when requesting HBV tests.

The following are some important facts to consider when ordering:

HBs Ag (HBV surface antigen)

This is a marker of current active HBV infection. It cannot differentiate between acute and chronic infection. Screen test of choice.

HBe Ag (HBVe antigen)

A marker of highly infectious active HBV infection. May be absent sometimes in certain mutated forms (core mutant)

HBs Ab (HBV surface antibody)

A marker of immunity to HBV. Cannot differentiate between immunity acquired from vaccine and natural infection.

HBe Ab (HBVe antibody)

Another marker of immunity, but not protective and not indicative of resolved infection.

HBc IgM (HBV core IgM antibody)

A marker of acute HBV infection. The first reliable marker to appear in HBV infection.

HBc Ab (Total HBV core antibody)

Another marker used to differentiate naturally acquired immunity from immunization acquired immunity.

HBV DNA (quantitative or qualitative)

Only to be used under special circumstances, a marker of active HBV replication.

LABORATORY TESTS	SPECIMEN REQUIRED	MIN. VOL. REQ. FOR TESTS (mL)	FREQUENCY OF TESTING	TURN-AROUND TIME IN WORKING DAYS
ASOT	Serum	.1-.5	Weekly	6
CHLAMYDIA IgM Ab	Serum	.5-1	Bimonthly	12
CMVIgG	Serum	.2-.5	Weekly	6
CMVIgM	Serum	.1-.5	Weekly	6
EBV IgM & IgG	Serum	.1-.5	Weekly	6
HB Core IgM & IgG	Serum	1-5	Daily	2
HBsAG	Serum	1-5	Daily	2
HCV GENOTYPING	Plasma (EDTA)	5	Batched	21
HCV-RNA	Plasma (EDTA)	1-2	Batched	7
Hbs Ab	Serum	1-5	Daily	2
HBV Viral Load	Plasma (EDTA)	5	Batched	10
HCV Ab	Serum	1-5	Daily	2
HCV Viral Load	Plasma (EDTA)	5	Batched	21
HEP A IgG	Serum	1-5	Daily	2
HEP A IGM	Serum	1-5	Daily	2
HIV 1/2 Ab	Serum	1-5	Daily	2
HIV Viral Load	Plasma (EDTA)	5	Batched	5
H. PYLORI Ab	Serum	1-5	Bi-weekly	5
HSV IgM & IgG	Serum	.1-.5	Weekly	6
HTLV 1/2	Serum	1-5	Weekly	6
LYME Ab	Serum	.5-1	Weekly	6
MEASLES IgM & IgG	Serum	.1-.5	Weekly	6
MUMPS IgM & IgG	Serum	.1-.5	Weekly	6
MYCOPLASMA IgM	Serum	.1-.5	Bi-monthly	12
PARVO IgM & IgG	Serum	.2-.5	Weekly	6
PNEUMOCOCCAL Ab (pre and post-vaccine sample required)	Serum	.5-1	Monthly	25
RUBELLA IgG	Serum	.5-1	Daily	2
RUBELLA IgM	Serum	.1-.5	Weekly	6
SYPHILIS (PCR)	Swab, CSF, EDTA blood	.5	As required	20
SYPHILIS (RPR)	Serum	.5-1	Daily	2
SYPHILIS (VDRL)	Serum or CSF	.5-1	Daily	2
TOXOPLASMA IgM & IgG	Serum	.5-1	Weekly	6
VZV IgM	Serum	.1-.5	Weekly	6
VZV IgG	Serum	.1-.5	Daily	2
WEST NILE Ab	Serum	.5-1	Weekly (min.)	6
WNNAT	Plasma (EDTA)	5	Batched	6

NOTE: For STAT requests, please call Serology at 945-7582 or 945-7634.
During outbreaks or increased disease activity, testing may occur more frequently. The published testing frequencies represent baseline service.
West Nile Ab testing performed monthly during the winter season.

3.2 SAMPLE REQUIREMENTS

- Collect 5-10 mL of blood as early as possible after onset of illness. Tests requiring serum require 1 red top serum tube. For plasma collect 1 EDTA tube (purple top tube). Refer to Serology test list on previous page. Acute and convalescent or paired sera are:
  - **Acute: 1-3 days after onset of illness.**
  - **Convalescent: 21 days after onset of illness.**

Instructions for Viral Load (PCR) Testing and Genotyping

Specimen type and patient history are required to determine the most suitable test to perform. Following the instructions will reduce specimen rejection and unnecessary phone calls.

Requisition Requirements

- Use the general requisition (MG696) for Hepatitis B/C Viral Load (quantitative)
- Use 'Retrovirus Nucleic Acid' testing requisition form (MG5126) for HIV Viral Load
- Proper requisition and specimen information are required. Indicate specimen collection date, time, and patient's code or name on the requisition.
- Patient history, i.e. initial assessment, follow up, patient on treatment etc. is required to perform the proper test.
- Please ensure physician number, facility number, and the name and address for report distribution is filled in.

Specimen Type

- 10 cc whole blood in EDTA tube (purple top tube) **or**
- EDTA plasma: label the tube "EDTA plasma", and include patient's name and PHIN or code and requisition number.

Transport Requirements

- Deliver whole EDTA blood to CPL within 4 hours and no later than 4:00 p.m. during working days.
- Keep plasma refrigerated and deliver it within 24 hours, from collection time, on cold pack. For longer transportation time, store plasma frozen at -20ºC and deliver frozen to CPL.

Guidelines for Submitting Specimens for HIV1/2, HTLV I or HTLV I / II Provirus Testing

Specimen Collection - Whole Blood Only (Anticoagulant Required)

- Collect blood in EDTA tubes (lavender). Heparin (green) tubes will not be accepted. It is not necessary to include a red top (no anticoagulant) tube for serological testing.
- A minimum volume of 2 mL is required; 5 mL is preferred.
- Blood should be kept at room temperature at all times.

Shipping

- Record date blood was drawn. Specimen should be received at CPL Monday-Wednesday AM only.
- Ship by courier directly to CPL to ensure receipt within 4 hours of collection.
- Ship at ambient temperature; do not freeze or cool.

For further information, please contact 945-3183 or 945-7545.

Collection for syphilis PCR

Specimen

- Swab, CSF or EDTA whole blood.
- Minimum of 0.5 mL of CSF.
- Minimum of 0.5 mL of EDTA whole blood.

Collection Method

- Use buccal or Dacron swabs to obtain specimens from ulcers.

Specimen Processing, Storage and Shipping

- Store swabs, CSF and EDTA whole blood samples frozen until shipped for testing.
- Ship frozen on dry ice as Biological Substance, Category B, UN3373.

Serologic Antibody Tests Requiring Acute And Convalescent Bloods or Paired Sera

- Legionella
- Pneumococcal - Pre- and post-vaccination samples required. Post-vaccination sample must be collected at least 4 weeks after vaccination.

Serologic Antibody Tests Performed On A Single Sample; A Second Sample May Be Requested

- Arbovirus
- *Chlamydia spp.*
- Lyme disease
- Mycoplasma
- Parvovirus

Serologic Tests Generally Requiring Only A Single Sample (a second sample may be requested if the test result is indeterminate)

- Cytomegalovirus (CMV) IgM or IgG
- Epstein Barr virus (EBV) Antibodies
- *H. pylori Antibody*
- Hepatitis A, B, C, or other hepatropic viruses
- Herpes simplex IgM or IgG
- HTLV - 1/2 Antibody
- Human immunodeficiency virus (HIV) Antibody
- Measles Antibody
- Mumps Antibody
- Parasitic serology
- Parvovirus IgM or IgG
- Rubella Antibody
- Syphilis Serology
- Toxoplasma Antibody
- Varicella zoster virus IgM or IgG

3.3 REQUISITIONS

Use the general requisition (MG696) for all testing except non-nominal HIV. Fill out requisition completely, see Section 1.1.1 for requirements.

HIV Ab requisition (MG13396) must be completed for non-nominal HIV antibody testing. Include complete code, epidemiologic data, physician billing number, facility number, phone number, and check off informed consent box. Results will be delayed if code and epidemiological data are not complete. Do not submit consent form to CPL.

HIV viral load - use the Retrovirus Nucleic Acid Testing Requisition (MG5126): see previous section *Instructions for Viral Load (PCR) Testing and Genotyping.*

3.4 TRANSPORT

Ship serum or plasma in tightly capped polypropylene tubes.
Place specimens individually in leak proof bags with requisition on the outside of the bag. DO NOT USE STAPLES.

3.5 REFERRED OUT SEROLOGY TESTS

ADB
Amoeba Ab
Anaplasma phagocytophilum
Anti-delta Ab
Anti-hepatitis E virus
Arbovirus Ab
Aspergillus Ab
Babesia Ab
Babesia microti PCR
Bartonella henselae Ab
Baylisascaris Ab
Blastomyces Ab
Botulinum Ab titre
Botulinum toxin
Brucella Ab
C. burnetti Ab
Chlamydophila psittaci Ab
Coccidioides Ab
Cryptococcus Ag & Ab
Cysticercosis Ab
Diphtheria Ab
EBV early Ag
EBV nuclear Ag
Endemic treponematoses PCR
Endemic typhus Ab
Erlichia chafeensis
Escherichia
Fascioliasis Ab
Filaria Ab
FTA-ABS (CSF)
Haemophilus influenzae B Ab
Hantavirus Ab
HBV DNA qualitative
HBV drug resistance testing
HBV genotyping
HBV pre-core mutation
HBV surface Ag mutation
HDV RNA
HEV Ab and RT-PCR
HHV-8 Ab
Histoplasma Ab
HIV co-receptor tropism
HIV-genotyping
HIV proviral DNA tropism
HIV1/2 provirus
HTLV-I viral load
HTLV I/II provirus
Human granulocytic ehrlichiosis
Hydatid/Echinococcus Ab
Leishmania Ab & PCR
Legionella Ab
Leptospira species Ab
Lyme PCR
Lymphocytic choriomeningitis Ab
Lymphogranuloma venereum Ab
Malaria Ab PCR
Meningococcus Ab
Orientia tsutsuganushi Ab
Pneumococcus Ab
Rabies antibody (RFFIT)
Rickettsia Ab
Rubella IgG avidity
Schistosoma Ab
Strongyloides Ab
Syphilis PCR
Tetanus Ab
Toxocara Ab
Toxoplasma IgG avidity
Trichinella Ab
Trypanosoma (African) Ab & PCR
Trypanosoma (American) Ab & PCR
Tularemia Ab
Yellow fever Ab
Yersinia species Ab

Note: This is not an exclusive list. Please include clinical symptoms and travel history when ordering tests.

3.6 PARASITOLOGY TESTING

Specimen Collection:

- Reliable screens for enteric ova and parasites require 2-3 stool samples collected on different dates.
- Specimen must be thoroughly emulsified at the time of collection. One part of stool into three parts SAF fixative.
- Specimens not in fixative, or not in proper clinical containers, will not be processed (exception: *Cryptosporidium* speciation).
- Specimens for ova and parasites from patients hospitalized for more than 3 days are not appropriate.
- Ensure patients are free of barium, cathartics or antibiotics as these substances may interfere with the examination.
- For information regarding other parasitology services offered at CPL, please call the Parasitology lab directly at 945-7825.
- For scabies skin scrapings: Place a single drop of mineral oil over unexcoriated burrow. Scrape lesion 6-7 times with a 15 scalpel blade until tiny specks of blood appear. The mineral oil will emulsify the scrapings. Transfer the emulsified scrapings with the blade to a clean glass slide and cover with a cover slip. Repeat several times. Package securely and forward to CPL expediently. CPL will do a microscopic exam to look for any stage or sex of mite, feces, eggs and egg casings.

NOTE: For *Cryptosporidium* speciation in outbreak cases, submitted stool must be preservative-free.

Requisition:

- Use the CPL General Requisition (MG696) for ordering parasite investigations.
- Ensure all relevant clinical information is given; i.e. symptoms, history of travel, etc. This will affect test selection at CPL. Include pertinent symptoms and travel history.

CAUSAL AGENT ***Note: Processed daily.***	SPECIMEN REQUIRED	TEST PERFORMED
Acanthamoeba species	Contact Parasitology laboratory	
Ancylostoma duodenale *Necator americanus*	Feces in SAF	Microscopy
Angiostrongylus cantonensis	Contact Parasitology laboratory	
Arthropods (mites, ticks, fleas, lice, fly maggots, etc.)	Dead: submit dry or in 70% alcohol Alive: submit with slightly moistened cotton	Microscopy, Gross ID
Ascaris lumbricoides	Feces in SAF	Microscopy
	Worm passed in feces Submit unpreserved in 0.85% NaCl, or if there is a delay in transit of three or more days, submit in 5% formalin or 70% alcohol.	Gross ID Serology
Babesia species	Thick and thin blood films Blood with anticoagulant (EDTA)	Microscopy
Balantidium coli	Feces in SAF	Microscopy
Blastocystis hominis	Feces in SAF	Microscopy
Clonorchis sinensis (Chinese liver fluke) *Opisthorchis felineus* *Opisthorchis viverrini* *Metorchis conjunctus*	Feces in SAF	Microscopy
Cryptosporidium species	Feces in SAF	Microscopy
Cyclospora cayetanensis	Feces in SAF	Microscopy
Cysticercosis (pork tapeworm, larval stage)	Serum	Serology
Demodex folliculorum *Demodex brevis*	Skin scrapings including hair follicles and sebaceous glands Submit dry or mounted between two slides. Prior consultation is preferable.	Microscopy
Dientamoeba fragilis	Feces in SAF	Microscopy
Diphyllobothrium species (broad fish tapeworm)	Feces in SAF Worm segments Submit unreserved in 0.85% NaCl, or if there is a delay in transit of three or more days, submit in 5% formalin or 70% alcohol.	Microscopy

CAUSAL AGENT ***Note: Processed daily.***	SPECIMEN REQUIRED	TEST PERFORMED
Echinococcus granulosus (dog tapeworm) *Echinococcus multilocularis*	Aspirated fluid from cyst Contact Parasitology laboratory Cyst, excised Serum	 Ab detection
Entamoeba histolytica	Feces in SAF Serum	Microscopy Ab detection
Enterobius vermicularis (pinworm)	Pinworm paddle applied to perianal region Vaseline paraffin anal swab or cellulose (transparent NOT translucent or opaque) tape preparations	Microscopy
Fasciola gigantica *Fasciola hepatica*	Feces in SAF	Microscopy
Fasciolopsis buski	Feces in SAF	Microscopy
Giardia lamblia (duodenales)	Feces in SAF Duodenal drainage	Microscopy
Heterophyes heterophyes *Metagonimus yokogawai*	Feces in SAF	Microscopy
Leishmania tropica	Smear from edge or base of lesions Contact Parasitology laboratory Serum	Micro (indicate)
Leishmania brasiliensis *Leishmania mexicana*	Smear from edge or base of lesions Contact Parasitology laboratory Serum	Micro (indicate)
Leishmania donovani (infantum)	Thick and thin blood films Contact Parasitology laboratory Biopsy material (spleen, liver, lymph nodes) Blood with anticoagulant (EDTA) Serum	Microscopy (indicate) Ab detection
Loa loa (African eye worm)	Thick and thin blood films Blood with anticoagulant (EDTA)	Microscopy (indicate) Ab detection
Microsporidia	Feces in SAF	Microscopy (indicate)
Maggots	Maggots (clinical specimens only) Dead: submit dry or in 70% alcohol Alive: submit with slightly moistened cotton	Microscopy Gross ID

CAUSAL AGENT ***Note: Processed daily.***	SPECIMEN REQUIRED	TEST PERFORMED
Naegleria species *Hartmannella* species *Acanthamoeba* species others	Contact Parasitology laboratory	
Onchocerca volvulus *Mansonella streptocerca*	Skin biopsy Contact Parasitology laboratory Aspirated material from skin nodules Excision of nodule	Microscopy (indicate)
Paragonimus species (lung fluke)	Feces in SAF Sputum	Microscopy Microscopy
Pediculus humanus capitis (head louse) *Pediculus humanus corporis* (body louse) *Phthirus pubis* (crab louse)	Adults, nymphs, or eggs ("nits") Submit dry or in 70% alcohol. Infested hairs	Microscopy
Plasmodium vivax *Plasmodium malariae* *Plasmodium ovale* *Plasmodium falciparum* *Plasmodium knowlesi*	Thick and thin blood films from finger blood (at height of paroxysm and 8-16 hours later) Blood with anticoagulant (EDTA)	Microscopy (indicate) Ab detection
Sarcoptes scabiei	Skin scrapings at end of tracks, fresh Submit dry or mounted mineral oil scrapings between two slides. Prior consultation is preferable.	Microscopy
Schistosoma haematobium (bladder blood fluke)	Urine Serum	Submit mid-stream to terminal urine Microscopy Serology
Schistosoma japonicum (oriental blood fluke)	Feces in SAF Serum	Microscopy Serology
Schistosoma mansoni *Schistosoma intercalatum*	Feces in SAF Serum	Microscopy Serology
Strongyloides stercoralis	Feces in SAF Duodenal contents by intubation serum Sputum	Microscopy Microscopy Ab detection

CAUSAL AGENT ***Note: Processed daily.***	SPECIMEN REQUIRED	TEST PERFORMED
Taenia saginata (beef tapeworm) *Taenia solium* (pork tapeworm)	Feces in SAF Worm segments Submit unpreserved in 0.85% NaCl, or if there is a delay in transit of three or more days, submit in 5% formalin or 70% alcohol. Gross ID	Microscopy
Toxoplasma gondii	CSF Contact Parasitology laboratory Biopsy material Whole blood in anticoagulant Serum	PCR Ab detection
Trichinella spiralis	Serum	Ab detection
Trichostrongylus species	Feces in SAF	Microscopy
Trichuris trichiura (human whipworm)	Feces in SAF	Microscopy
Trypanosoma rhodesiense *Trypanosoma gambiense*	Blood films, thick and thin Lymph aspirated from nodes CSF Serum	Microscopy Ab detection
Trypanosoma cruzi	Blood films, thick and thin Lymph aspirated from nodes CSF Serum	Microscopy Microscopy Ab detection
Wuchereria bancrofti *Brugia malayi* *Mansonella perstans* *Mansonella ozzardi* *Loa loa*	Blood smear, thick and thin Blood with anticoagulant Aspiration from lymph vessels and nodes Serum	Microscopy (indicated) Microscopy Ab detection

Note: Not an exclusive test list.

4.0 VIRUS DETECTION

Clinical virology services involve the isolation or detection and identification of human viral pathogens from clinical specimens using established procedures such as:

- Cell culture – many viruses are grown and identified in established cell lines.
- Rapid diagnostics – sensitive and specific procedures that provide accurate results within hours to aid in patient management.
  - Electron microscopy (EM)
  - Immunofluorescent antibody techniques
  - Latex agglutination
  - Enzyme linked immunosorbent assays (ELISA)
  - Molecular-based diagnostics
  - Immunochromatographic membrane assay
- Viral strain identification – subtyping for epidemiological and public health purposes, i.e., outbreak management, etc.
  - Neutralization
  - Immunofluorescence
  - Hemagglutination inhibition
  - Immunoelectron microscopy
  - Molecular-based typing
  - ELISA
  - Embryonic egg inoculation

Emergency on-call service (paging system)

Call 945-6655 and the on-site Security Guard will refer the call to the medical staff on call. A technologist is always available for STAT testing requests.

Other services

- Virology studies and projects generated from outside Manitoba Health.
- Education activities including participation in University of Manitoba post-graduate medical education programs.
- International Reference Centre for EM Virology.

Transplant program support

Surveillance for, and diagnosis of viral infections common in immunocompromised patient populations and monitoring of response to antiviral therapy.

Public Health program support

- Participation in various surveillance programs (national and international).
- Viral strain characterization.

- Meningoencephalitis exanthematous, respiratory and enteric outbreak investigations.
- Setting public health policy regarding viral disease.

Referral services

- Low volume or esoteric test requests are forwarded to reference laboratories.
- Level 3 and 4 pathogen investigations and prion investigations are forwarded to appropriate reference facilities.

Note: This is a general description of services and not meant to be exclusive.

4.1 SPECIMEN REQUIREMENTS

- Most viruses do not survive well at room temperature.
- Feces should be sent fresh, unpreserved and unfrozen.
- EDTA blood must be kept at room temperature and must reach the laboratory within six hours of collection if it is being sent as whole blood. See 4.2 for further instructions.
- Other specimens for virus isolation should be refrigerated and transmitted to the laboratory as quickly as possible (e.g. cold pack). Swabs should be sent in virus transport medium (VTM), see Transport Media (Section 1.6). Ensure each specimen is properly numbered.

If in doubt, always consult with the laboratory before sending the specimen. A brief clinical history, DATE OF ONSET of symptoms, the DATE OF COLLECTION and the TYPE of specimen must accompany each specimen. Be sure to include presence of outbreak and a contact phone number.

4.2 SPECIMEN COLLECTION

Specimens should be collected as early in the disease as possible. **Do not send dry swabs or swabs in bacterial transport medium.**

4.2.1 Blood for quantitative CMV NAAT: 5 mL purple top EDTA tube (without separator). Must be kept at room temperature and must reach CPL within six hours of collection (during working hours) if it is being sent as whole blood. If the specimen cannot be forwarded to CPL within these parameters, the specimen should be centrifuged at 800xg for 20 minutes and the plasma removed. The plasma should be marked as EDTA plasma, and kept at 4ºC and transported with a cold pack.

4.2.2 **Blood for BK virus:** Requires a minimum 5 mL purple top EDTA tube (without separator).

4.2.3 **Blood for quantitative EBV:** Requires a purple top EDTA tube (without separator) taken and delivered to CPL on Monday or Tuesday before 4:30 p.m. or Wednesday before 12:00 p.m.

4.2.4 **Bone marrow aspirate:** Collect in purple top EDTA tube (without separator). Immediately invert several times to mix properly. Must be kept at room temperature and deliver to CPL within six hours.

4.2.5 **Bronchial Alveolar Lavage (BAL):** 10 mL in a sterile container. If < 3 mls, add to a VTM bijou. Keep at 4°C.

4.2.6 **CSF:** See Section 2.1.5, items 1-4 for collection instructions. A minimum of 0.5 mL is required for each test requested. Keep at 4°C.

4.2.7 **Genital or mouth swabs for Herpes:** Use dacron, rayon or flocked swabs. Calcium alginate swabs or wood-shafted are not recommended. Swab the affected area, break off swab into VTM. Keep at 4°C.

4.2.8 **Lesion:** Expose and clean base of lesion with sterile gauze and saline. Scrape epithelial cells from base vigorously with a sterile swab. If dry, moisten swab in sterile saline, swab lesion, break off into VTM. Use a cotton or rayon swab, not calcium alginate. Keep at 4°C.

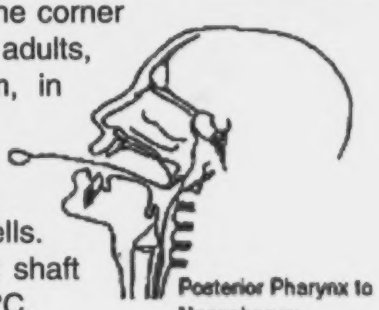
4.2.9 **Lesion Smear for Molluscum contagiosum only:** Touch a glass microscope slide directly to an unroofed lesion. Air dry. Do not use cover slip or fixative. Place slide in slide-mailer and secure with an elastic band or clip. A swab in VTM is also an appropriate specimen. Keep at 4°C.

4.2.10 **Nasal Swab:** Swab anterior nares as far back as possible. Break off into VTM. This specimen is not suitable for RSV rapid testing. An NP swab is a more appropriate specimen (see 4.2.12). Keep at 4°C.

4.2.11 **Nasopharyngeal aspirate:** Place a flexible plastic catheter gently into the posterior nasopharynx. Apply gentle suction with a syringe or wall suction, collect sample into a trap device, flush with 2.0 mL of VTM, then transfer to a sterile bijou bottle; **do not send the trap or tubing**. Keep at 4°C.

4.2.12 Nasopharyngeal swab:

a. Per nasal method: Remove any mucous from the patient's nose. Tilt the patient's head back slightly (about 70°) to straighten the passage from the front of the nose to the nasopharynx to make insertion of the swab easier. Gently insert a flocked swab into the nasopharynx (half the distance from the corner of the nose to the front of the ear). In adults, this distance is usually about 4 cm, in children this distance is less. Gentle rotation of the swab may be helpful. Rotate the swab several times to dislodge the columnar epithelial cells. Place swab(s) in VTM and break/cut shaft short enough to fit in bottle. Keep at 4°C.



Posterior Pharynx to Nasopharynx

b. Per ora method: Insert a flocked swab (if small-tipped, wire shaft used then bend shaft to give a slight curve) into the nasopharynx by passing the swab up behind the soft palate (see Figure). Vigorous swabbing will be more likely to collect the needed nasoepithelial cells. Place swab in VTM and break/cut shaft short enough to fit in bottle. Keep at 4°C.

4.2.13 Rectal Swab: If stool is unobtainable, a rectal swab may be submitted. Break off into VTM. Keep at 4°C.

4.2.14 Stool (Raw): Submit raw material in sterile container (no more than one-half full), without any preservatives or transport media. **DO NOT FREEZE.** Keep at 4°C.

4.2.15 Throat Swab (Oropharyngeal): Use dacron or rayon-tipped swab. Swab back of throat vigorously. Break off swab into VTM. Keep at 4°C. This specimen is not suitable for RSV rapid testing.

4.2.16 Tissue Biopsy: A minimum specimen diameter of 2 mm is required. Tissue should be suspended in VTM for transport. Keep at 4°C.

4.2.17 Trachael Secretion: Add specimen to VTM. Keep at 4°C.

4.2.18 Urine: Approximately 15 to 20 mL is required. Place in sterile container. Keep at 4°C.

4.2.19 Vesicle Fluid: Disinfect area with alcohol swabs (except if vesicle is located on mucous membrane.) **Remove 1.5 mL** of VTM from Bijou bottle. Fluid is collected by piercing the vesicle with a sterile needle attached to a tuberculin syringe, and aspirating as much material as possible. Rinse needle and syringe in the 0.5 mL VTM remaining in Bijou bottle. Discard needle and syringe. Keep at 4°C.

LABORATORY TESTS	SPECIMEN REQUIRED	TEST METHODS	FREQUENCY OF TESTING	TURN-AROUND TIME
Adenovirus	Respiratory, Throat NPA, Eye, Fecal	Tissue Culture	Daily	3-14 days
	Fecal	Electron Microscopy	Daily	1-2 days
Coronavirus	Fecal	Electron Microscopy	Daily	1-2 days
Coxsackievirus	Respiratory, Fecal	Tissue Culture	Daily	3-14 days
CytomegaloVirus (CMV)	Urine, amniotic fluid, Respiratory, Biopsy, Bone Marrow Aspirate EDTA Blood	Tissue Culture	Daily	7-21 days
	CSF (on request)	NAAT	Mon.-Wed.	1-5 days
Echovirus & Enterovirus	Respiratory, Fecal	Tissue Culture	Daily	3-14 days
	CSF (meningitis)	NAAT	Referred out	2-7 days
Epstein Barr (EBV)	CSF EDTA blood should be taken and delivered to CPL on Mon. or Tues. before 4:00 p.m. or Wed. before 12:00 p.m.	NAAT	Thurs.	1-7 days
Herpes simplex	Lesion swabs, CSF	NAAT	Mon., Wed., Fri.	2-5 days
	Lesion swab only	IFA		STATS-3 hrs.
Herpes	Vesicle fluid	Electron Microscopy	Daily	2-4 days
Human Herpesvirus 6, 7, 8	CSF	NAAT	Referred out	5-10 days
Influenza	Respiratory	Tissue Culture	Daily	3-10 days
		NAAT	Seasonal	1-7 days
	NP specimen	IMA	Seasonal	STAT-2 hrs.
Measles	Throat swab NP swab Urine	NAAT	STAT basis (needs prior CPL approval)	STAT-2 days
Molluscum contagiosum	Pustular Slide Swab in VTM	Electron Microscopy	Daily	1-2 days

LABORATORY TESTS	SPECIMEN REQUIRED	TEST METHODS	FREQUENCY OF TESTING	TURN-AROUND TIME
Mumps Virus	Buccal swab Urine	Culture NAAT	Daily STAT basis (needs prior CPL approval)	7-15 days
ORF	Pustular	Electron Microscopy	Daily	2-4 days
Papilloma Virus	Tissue, Biopsy	NAAT	Referred out	5-10 days
Polyoma (BK,JC)	Urine EDTA Blood	Electron Microscopy NAAT	Daily Referred out	2-4 days
Parainfluenza	Respiratory	Tissue Culture	Daily	5-14 days
Poliovirus	Respiratory, Fecal Fecal only	Tissue Culture Electron Microscopy	Daily	3-14 days 2-4 days
Poxvirus	Vesicle, Pustule (call lab before sending)	Electron Microscopy PCR	Referred out	2-4 days
Reovirus	Fecal	Tissue Culture Electron Microscopy	Daily	5-14 days 2-4 days
Respiratory syncytial virus	NPA, NPS, Trach secretions	Tissue Culture IMA	Daily Seasonal testing	3-14 days 1-4 days
Rhinovirus	Respiratory	Tissue Culture	Daily	7-14 days
Rotavirus	Fecal	Electron Microscopy	Daily	2-4 days.
Rubella	Products of conception Urine	Tissue Culture	Daily	7-14 days
SARS	Respiratory, fecal (call MOH before sending)	Culture PCR	Referred out	2-7 days
Small Round Virus	Stool	Electron Microscopy	Daily	2-4 days
Varicella Zoster	Lesion swab Base of lesion swabbed vigorously	Culture IFA	Daily Thursday	6-10 days 1-5 days STAT - 3 hrs.

NOTE: For STAT requests, please call Virology at 945-6858.
Not an exclusive test list.

5.0 NEWBORN SCREENING AND PUBLIC HEALTH CHEMISTRY

Newborn Screening

The Newborn Screening Section of CPL screens all newborn babies in Manitoba for inherited disorders of metabolism and endocrine dysfunction. The screening program is guided by the Manitoba Perinatal Screening Committee. Screening is performed at the biochemical and genetic levels using dried blood spot specimens collected following birth.

The Manitoba Perinatal Screening Committee defines neonates as less than 28 days of age; therefore any unscreened children older than this (including refugee and immigrant children) should have plasma amino acid and TSH studies requested through HSC Clinical Chemistry. Further laboratory studies relevant to ethnic background or country of origin should also be considered (e.g., sickle cell screen or hemoglobinopathy) when conducting screening for children over 28 days of age.

Newborns are screened for inborn errors of carbohydrate metabolism (Galactosemia), fatty acid oxidation defects (Carnitine Palmitoyl Transferase-type1 Deficiency), and amino acid metabolism defects (Glutaric Acidemia-type 1 and Phenylketonuria). Other screening assays detect disorders of endocrine function (Congenital Hypothyroidism and Congenital Adrenal Hyperplasia) and multiple carboxylase deficiency (Biotinidase). Cystic fibrosis screening was added to the panel in July 2011.

Babies born after September 23, 2011 will also be offered expanded newborn screening for an approximate additional 40 metabolic disorders, as part of the newborn screening panel.

Maternal Serum Screening

CPL, in collaboration with the Department of Human Genetics of the University of Manitoba, provides Maternal Serum Screening (MSS) to pregnant women in Manitoba as part of their prenatal care. This test provides an estimation of the risk for fetal open neural tube defects, Down Syndrome, Trisomy 18 and Smith-Lemli-Opitz syndrome (SLOS). CPL tests 4 biochemical markers (Quad Test) in the mother's blood that are produced by the fetus and placenta. The biochechemical markers are alpha-fetoprotein (AFP), unconjugated estriol (uE3), human chorionic gonadotropin (hCG), and Inhibin A (DIA).

Emergency or On-call

By special arrangement only. Contact the Chief Technologist to arrange coverage.

5.1 NEWBORN SCREENING PROGRAM

Cadham Provincial Laboratory supplies blood collection cards to birthing facilities, information pamphlets about the program to new parents, and program information to health care professionals upon request. Specimen collection instructions are provided on the back of the blood collection card and in the newborn screening guidelines for health care providers. Call (204) 945-7458 for supplies.

Specimen collection

Collection: Clean skin of heel with alcohol pledget, wipe dry with a sterile gauze pad. Puncture with disposable, 2.0 mm Lancet. If bleeding is slow, it is helpful to hold limb dependant for a short period of time before spotting blood on filter paper. Do not layer blood sample.

Full Term Baby: Take sample at time of hospital discharge, regardless of age. Babies sampled at less than 24 hours of age will require a repeat sample.

Premature or ill Baby: Take first specimen at five days of age and second specimen at two to three weeks of age or at time of hospital discharge, whichever comes first. Mark second specimen "repeat".

Home Birth: Take sample at two to three days of age.

Blood Card Handling: Fill **all** circles with blood, apply from **one** side only. Let blood soak through to the periphery of each circle. Allow to dry on a clean, dry surface at room temperature, *before* covering with the protective card flap (minimum 4 hours). Do not handle or contaminate blood spot area. Keep the card out of direct sunlight and away from heat sources while drying.

Deliver cards immediately to Cadham Provincial Laboratory.

All **requested information** must be supplied. Do not use regular postal services to mail the cards as this may cause unnecessary delays. Forward on the day of collection, if possible.

The largest percentage of poor specimens is the blood not soaking through the filter paper (false negative). Poor specimens require a second collection.

Samples collected at <24 hours of age

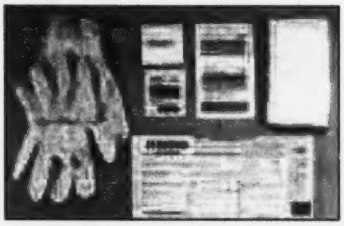
Infants whose first sample is taken at <24 hours of age, will be referred to the appropriate public health office for the collection of a second sample to prevent false negatives. Substrate-dependent disorders (Galactosemia and Phenyketonuria) require the newborn to be feeding well.

Twins

At 2 weeks of age, twins will be referred to the appropriate public health office for the collection of a second sample for a repeat TSH test. This is to rule out congenital hypothyroidism of one infant masked by the healthy twin on the first screen due to *in utero* twin-to-twin transfusion. Repeat samples will be requested from all same-gender twins. In cases of male and female twins (fraternal twins) the public health office will be contacted to verify the gender of the twins, but further follow-up will not be required.

Results

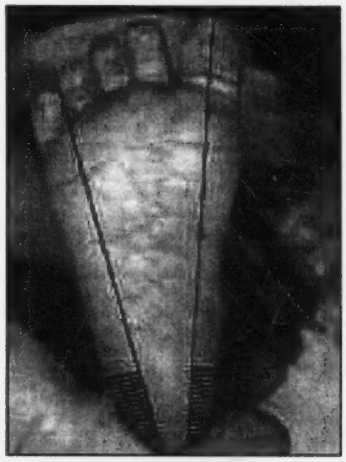
A negative report will be sent to the Medical Records Department of the birthing facility or to the practitioner if no facility is indicated. Immediate referral to a pediatric consultant is made in cases of significantly abnormal findings or critically elevated results. In cases of moderately elevated results, a request for a repeat sample is made to the infant's follow-up physician, midwife, Public Health Nurse, or the Nurse-In-Charge for newborns living in remote communities.



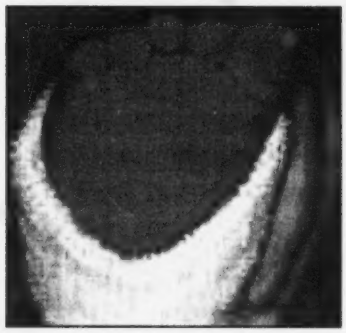
Neonatal Screening: Blood Specimen Collection and Handling Procedure

1. Equipment: sterile lancet with tip less than 2.0 mm, sterile alcohol prep, sterile gauze pads, soft cloth, blood collection card, gloves.

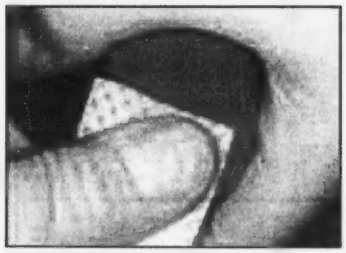
2. Complete ALL information. Do not contaminate filter paper circles by allowing the circles to come in contact with spillage or by touching before or after blood collection.



3. Hatched area (▨)indicates safe areas for puncture site.

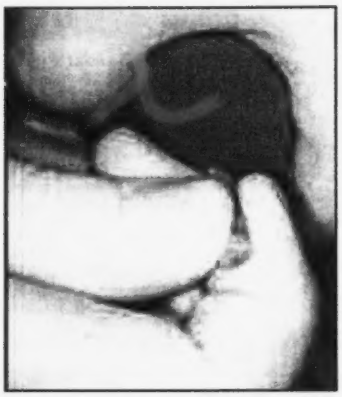


4. Warm site with soft cloth, moistened with warm water up to 41°C, for three to five minutes.

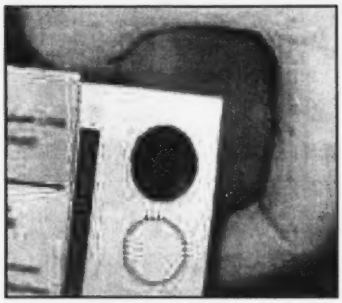


5. Cleanse site with alcohol prep. Wipe DRY with sterile gauze pad.

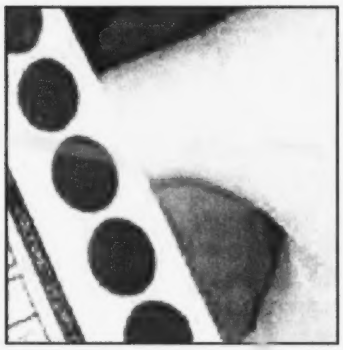
Reference: Schleicher & Schuell



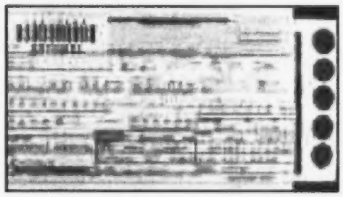
6. Puncture heel. Wipe away first blood drop with sterile gauze pad. Allow another LARGE blood drop to form.



7. Lightly touch filter paper to LARGE blood drop. Allow blood to soak through and completely fill circle with SINGLE application to LARGE blood drop. (To enhance blood flow, VERY GENTLE intermittent pressure may be applied to area surrounding puncture site). Apply blood to one side of filter paper only.

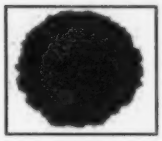


8. Fill remaining circles in the same manner as step 7, with successive blood drops. If blood flow is diminished, repeat steps 5 through 7. Care of skin puncture site should be consistent with your institution's procedures.



9. Dry blood spots on a dry, clean, flat non-absorbent surface for a minimum of four hours. (**Note:** This is not a current sample of the CPL form).

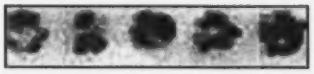
10. Deliver completed card for testing to CPL within 24 hours of collection if possible.



VALID SPECIMEN

Simple Spot Check

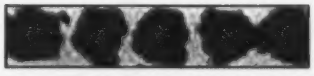
Allow a sufficient quantity of blood to soak through to completely fill the preprinted circle on the filter paper. Fill all required circles with blood. Do not layer successive drops of blood or apply blood more than once in the same collection circle. Avoid touching or smearing spots.



1. Specimen quantity insufficent for testing.

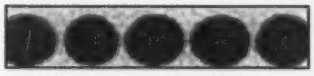
Poor Specimens - Possible Causes:

- Removing filter paper before blood has completely filled circle or before blood has soaked through to second side.
- Applying blood to filter paper with a capillary tube.
- Allowing filter paper to come in contact with gloved or ungloved hands or substances such as hand lotion or powder, either before or after blood specimen collection.



2. Specimen appears scratched or abraded.

- Applying blood with a capillary tube or other device.



3. Specimen not dry before mailing.

- Mailing specimen before drying for a minimum of two hours.

4. Specimen appears supersaturated.

- Applying excess blood to filter paper, usually with a device.
- Applying blood to both sides of filter paper.

5. Specimen appears diluted, discolored or contaminated.

- Squeezing or "milking" area surrounding the puncture site.
- Allowing filter paper to come in contact with gloved or ungloved hands or substances such as alcohol, formula, antiseptic solutions, water, hand lotion or powder, etc., either before or after blood specimen collection.
- Exposing blood spots to direct heat.

6. Specimen exhibits serum rings.

- Not wiping alcohol from puncture site before making skin puncture.
- Allowing filter paper to come in contact with alcohol, hand lotion, etc.
- Squeezing area surrounding puncture site excessively.
- Drying specimen improperly.
- Applying blood to filter paper with a capillary tube.

7. Specimen appears clotted or layered.

- Touching the same circle on filter paper to blood drop several times.
- Filling circle on both sides of filter paper.

MANITOBA NEWBORN SCREENING PROGRAM

Condition	Congenital Hypothyroidism (CH)	Galactosemia	Multiple carboxylase deficiency	Congenital adrenal hyperplasia (CAH)	Amino Acidemias*	Organic Acidemias	FAOD*	Glutaric Acidemia Type 1 (GA-1)	Carnitine palmitoyltransferase Type 1 (CPT-1)
Test	Thyroid stimulating hormone (TSH)	Galactose and galactose-1-phosphate	Biotinidase	17-OH-progesterone (17-OHP)	Tandem Mass Spectrometry	Tandem Mass Spectrometry	Tandem Mass Spectrometry	Allele Specific PCR for the Island Lake mutation	PCR amplification restriction enzyme digestion
Follow-up Test		Beutler spot test uridyl transferase	Semi-quantitative biontinidase		Interpretation required	Interpretation required	Interpretation required	N/A	N/A
Reference Range	<30 mIU/L at<=72 hours of age; <20 at> 72 hours of age	<400 µmol/L	O.D.>0.06	<25 nmol/L	See table next page	See table next page	See table next page	Not homozygous for the Island Lake	Not homozygous for mutation
Action: Moderately elevated results	Second request made to follow-up health care provider							N/A	N/A
Action: Critically elevated results	Referral to Pediatric Consultant								
Time tested	Twice weekly: Monday & Tuesday	Daily: Monday - Friday	Three times weekly: Monday Tuesday, Thursday	Daily: Monday - Friday	Daily	Daily	Daily	Bi-weekly	Bi-weekly

	Normal Range (μmol/L)	Critical Range (μmol/L)
Glycine	<811	
Arginine	1.3 - 4.0	
Ornithine	<150	
Citrulline	<35	>100
Alanine	<528	
Valine	<250	>667
Leucine	<275	>344
Methionine	<52	>69
Phenylalanine	<110	>189
Tyrosine	<250	>625
C0	12 - 80	>171
C2	11 - 70	
C3	0.6 - 6.5	>11.5
C4	<1	>3.1
C5:1	<0.1	
C5	<0.4	>1.6
C40H	<0.56	
C6	<0.2	
C50H	<0.5	>1.15
C8	<0.3	>1.2
C3DC	<0.2	
C10:2	<0.08	
C10:1	<0.21	
C10	<0.3	
C4DC	<0.8	
C5DC	<0.18	>0.54
C12:1	<0.32	
C12	<0.45	
C6DC	<0.16	
C14:2	<0.12	
C14:1	<0.5	>1.07
C14	<0.6	
C16:1	<0.54	
C16	0.7 - 7.2	>10
C16:1OH	<0.12	
C160H	<0.1	>0.1
C18:2	0.04 - 0.61	>0.83
C18:1	0.4 - 2.73	>4
C18	0.3 - 2.27	
C18:1OH	<0.08	>0.08
C18OH	<0.08	>0.08

Condition Group	Condition
ENDOCRINE DISORDERS	Primary congenital hypothyroidism
	Congenital adrenal hyperplasia (CAH) (21-hydroxylase deficiency)
GENETIC DISORDERS	Biotinidase deficiency (BIOT)
	Cystic Fibrosis
GALACTOSEMIAS	Classical galactosemia
	Galactokinase deficiency
	Galactose epimerase deficiency
FATTY ACID OXIDATION DISORDERS	Carnitine uptake deficiency
	CPT 1 deficiency
	Carnitine palmitoyltransferase (CPT2)
	Carnitine/acylcarnitine translocase deficiency (CACT)
	Glutaric acidemia 2
	Long chain hydoxyacly-CoA dehydrogenase deficiency (LCHAD) Trifunctional protein deficiency (TFP)
	Medium chain acyl-CoA dehydrogenase deficiency (MCAD)
	Medium/Short Chain Acyl-CoA Dehydrogenase (M/SCHAD)
	Short-chain acyl-CoA deficiency (SCAD) Ethylmalonic encephalopathy Isobutyryl-CoA dehydrogenase deficiency
	Very Long Chain acyl-CoA dehydrogenase deficiency (VLCAD)
ORGANIC ACIDEMIAS	Beta-ketothiolase deficiency Holocarboxylase deficiency Multiple carboxylase deficiency HMG-CoA lyase deficiency 2- methyl-3-hydroxybutyric acidemia (2M3HBA) 3-methylglutaconic aciduria (3MGA) 3-methylcrotonyl-CoA carboxylase (3MCC)
	Glutaric acidemia 1
	Isovaleric acidemia Short/branched chain acyl-CoA dehydrogenase deficiency
	Malonic acidemia
	Methylmalonic acidemia Propionic acidemia
AMINO ACIDEMIAS	Argininemia Argininosuccinic aciduria Citrullinemia I (CIT) Citrullinemia II Pyruvate carboxylase deficiency
	Homocystinuria Hypermethioninemia Adenosylhomocysteine hydrolase deficiency
	Maple Syrup Urine Disease (MSUD)
	Phenylketonuria (PKU) Benign hyperphenylalaninemia Biopterin cofactor biosynthesis defect Biopterin cofactor regeneration defect
	Tyrosinemia I Tyrosinemia II Tyrosinemia III

5.2 MATERNAL SERUM SCREENING (QUAD TESTING) PROGRAM

There are two components to Maternal Serum Screening. The first is alpha-fetoprotein (AFP) screening, and the second component includes unconjugated estriol (uE3 in combination with human chorionic gonadotropin (hCG) dimeric inhibin A (DIA) and with the AFP. This combination is known as the quad test or four-marker.

Specimen requirements

A minimum of 0.5 mL of serum is required at 16 - 18 weeks of gestation for testing. Collect a minimum of 5.0 mL of blood in a serum separator tube; a full 9-10 mL serum separator tube preferred (minimum half-full required). Within two hours of collection, centrifuge to separate the serum from cells (Plasma is not suitable). Send centrifuged primary tube,(no aliquots) properly labeled to CPL as soon as possible, DO NOT SEND ALIQUOTS IN PLASTIC TUBES. Delay in sending sample should be avoided. If delay is unavoidable, do not freeze. Store the centrifuged specimen at 4°C until shipment. Samples seven or more days in transit may be compromised for analytes tested.

Requisition requirements

Please fill in all clinical information on the Manitoba Maternal Serum Screen requisition as completely and accurately as possible. This is essential to ensure correct calculation of the risk. Turn around time is significantly improved when all required information is included on the requisition. The following patient information is **absolutely required** for accurate interpretation:

1. Name of patient
2. PHIN
3. Date of birth
4. Gestational age:
    - Ultrasound date and measurements (BPD, CRL or composite gestational age), (u/s is most accurate for interpretation).
    - Last menstrual period (LMP) date.
    - Expected Date of Confinement (EDC).

Results

Samples obtained between 16-18 weeks of gestation are optimal. However, samples received between 15 weeks and 20 weeks 6 days can be interpreted. A limited MS AFP interpretation can be made up to 23 weeks 6 days. Follow-up of abnormal results can be referred to the Human Genetics

Department of the University of Manitoba, CSB - FE211, 820 Sherbrook Street, Winnipeg, Manitoba; telephone 787-2097 or 787-2098.

6.0 INFORMATION MANAGEMENT

The Information Management section is responsible for the provision of service in five main areas for microbiology, serology, virology and public health chemistry:

- Data entry services
- Patient inquiry services
- Results reporting (paper/fax)
- Data requests
- Request for data retrieval

Data Entry Services

- Data entry of all incoming requisitions (excluding Newborn Screening and Maternal Screening) will match patient demographics with the Client Registry to ensure the integrity of the CPL database in matching test requests and maintaining a comprehensive patient profile.

- All requests for laboratory testing must be accompanied by a completed CPL requisition. The integrity of the data entered into the CPL database is compromised by incomplete or illegible requisition information, and may result in rejection or delayed reporting. Requisition entry requires extensive searching on the Client Registry to ensure correct patient matching.

- **Equally important is the clarity and completeness of the "return report to" portion of the requisition. This will ensure prompt reporting to the ordering practitioner and if requested on requisition, a copy will be forwarded to another practitioner. If no practitioner or address is provided, the sample will be rejected.**

- Request to amend requisition information - changes to requisition information will require the completion of this form (see website: www.gov.mb.ca/health/publichealth/cpl/forms).

- Data entry and verification of laboratory results.

- Ensuring reportable results are flagged and reported to CDC in Manitoba and Nunavut.

Patient Inquiry Services

- Patient Inquiry - 945-6611

  Hours of operation: Monday - Friday 0800 - 1630 hrs.
  Saturday - Sunday 0800 - 1600 hrs.

  When making a telephone inquiry for results you will be asked to provide the following information to ensure the authenticity of the requester and also to ensure correct patient and/or results are being given. A log of all patient inquiry calls is maintained at CPL.

a. Your name, telephone number and institution you are calling from.

b. The patient PHIN is the most efficient way of searching patient results from both the online system and/or the archived tape files.

   When a PHIN is not readily available, you will be asked for the patient name, gender and date of birth. As many people have aliases or change names (married, etc.) this information may be required to verify the correct patient file.

c. The clerk will then verify with the caller the corresponding demographics and pertinent requisition information before providing results. If the request is for HIV results, or if any type of interpretation or explanation of results is required, the call will be transferred to the appropriate section.

d. Results (verbal and/or hard copy) may be provided with a valid request.

e. The requester must be verified before confidential information is provided by phone. Results will be released only to physicians, midwives, public health practitioners and/or their designates.

Reporting to one other practitioner will occur by completing the "Copy Report To" area on the general requisition.

f. In some cases it may be deemed necessary to have the requested results telephoned back to the physician and/or facility (certain results, results requiring interpretation or to validate the requester, preliminary results, etc).

g. Calls made to Patient Inquiry (204) 945-6611 after regular hours will receive a voice message and an alternate number to call for **emergent** requests - (204) 945-6655. CPL Security will record the information required and relay it to the physician on call. The computer system is available to the physician on call every day between 0600 and 2200 hours.

h. A request for a CPL sample in regards to testing outside of CPL requires identification and a warrant. For more information call the Chief Technologist of Technical Support Services at 945-6230.

Results Reporting - Paper and Fax

- Based on the return address information, result reports will be produced either on paper or fax. CPL's default policy is to deliver reports by confirmed secure fax.

- Some paper reports printed at CPL are mailed or couriered out where faxination is not feasible.

Requests for Data Retrieval

- Co-ordinate and respond to all incoming requests for the retrieval of data including statistical requests, patient profiles, reprinting of previous reports, etc.

  Requesters may be asked to complete a CPL Data Request Form according to the CPL Data Request Guidelines (see below).

  A charge for service will be applicable to agencies outside Manitoba Health. Once the Data Request is received an estimate of cost will be provided.

Data Request Guidelines

1. Requests for CPL data (internal and external), will be made using the CPL Data Request Form (see website: www.gov.mb.ca/health/publichealth/cpl/forms) and forwarded to the Information Co-ordinator at 750 William Avenue (fax # 786-4770).

2. Once a request is assessed for priority and an estimated project time (internal) is given, the requestor will be notified with the estimated date of completion. Please provide as much lead time as possible.

Note: Research project requests for data may require ethics approval from an appropriate institutional review board (i.e., Faculty Committee on the Use of Human Subjects in Research, U of M, etc.) prior to approval at CPL.

3. All relevant correspondence must accompany the CPL Data Request form. In addition, all external research projects will require approval from the Health Information Privacy Committee (HIPC) if identifiable personal health information is requested.

4. The data report is sent to the requestor with the specialist's name(s) and contact number. If data includes personal health identifiers, Manitoba Health Information Systems Branch will receive the data and provide it to the requester. Any report generated using CPL data must be copied to the CPL specialist for review prior to publication to ensure appropriate interpretation.

5. The data request procedure will be reviewed at 6 months and then annually to ensure appropriateness.

Requests by Individuals or Their Representatives for Personal Health Information

- Requests to CPL by indviduals or legal representatives for personal health information must be in writing, except in an emergency (involving an immediate threat to the mental/physical health or safety of an individual the information is regarding). Whenever possible, the report will be forwarded to the appropriate attending physician.

- A standard request for information form will be used (see website: www.gov.mb.ca/health/publichealth/cpl/forms). The form will be submitted to the Privacy Officer.

- CPL must respond within thirty (30) days to the requester.

- A fee may be charged for acquisition of personal health information. A charge-back policy consistent with the fee regulated under *The Freedom of Information and Protection of Privacy Act* will apply (see website: www.gov.mb.ca/health/publichealth/cpl/forms).

7.0 ALPHABETICAL INDEX OF TESTING

SECTIONS: CM = Clinical Microbiology; NBS/PHC = Newborn Screening & Public Health Chemistry; PA = Parasitology; SE = Serology; VD = Virus Detection

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Actinomycosis (Actinomyces israelii)	Pus (preferably with granules) Bronchial washing Intrauterine device	Microscopy and special culture	CM
NOTES: Organism takes 3 or more days to grow in cultures. If suspected, Actinomyces culture must be specifically requested.			
Adenovirus infections (Adenoviruses types 1-41) upper respiratory tract; pneumonia; acute respiratory disease syndrome (ARD); Infections of conjunctiva	Throat swab in VTM NPA, NP swab in VTM Conjunctival swab Lung aspirate or biopsies in VTM.	Viral culture	VD
Gastroenteritis	Feces	EIA (Types 40/41), EM, Culture	VD
Aeromonas hydrophila group	Stool or rectal swab	Culture	CM
NOTES: Causal agent of diarrhea.			
AIDS	Clotted blood or serum	Serology - EIA WB confirmatory	SE
(HIV Virus)	EDTA blood	Viral load Genotyping	
NOTES: HIV viral load increases up to 1000 copies/ml after several below detection results have been reported by several laboratories. These increases are not typically indicative of the development of drug resistance. Follow-up specimen in 4 weeks may help in resolving this issue. Viral load and genotyping only done on confirmed positives. Use special HIV antibody and viral load requisitions only. See section 3.2.			
Amebiasis (see Dysentery, amebic, amebic encephalitis amebic hepatitis)			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Amebic encephalitis *(Hartmanella, Naegleria, Ancanthamoeba species)*	CSF	*Microscopy for* trophozoites	PA
NOTES: DO NOT REFRIGERATE CSF specimens. Infection acquired from water by swimming or bathing, even in chlorinated pools. Suspicion of amebic disease must be indicated on the requisition.			
Amebic hepatitis *(Entamoeba histolytica)*	Clotted blood or Serum	Serology	PA
Anaerobic infections (see also Gas Gangrene)	Pus from deep abscesses, brain, lung or pelvic region or body cavities in TM. See also pus. Lung aspirates or biopsies.	Microscopy and culture	CM
NOTES: Many anaerobic strains are slow to grow and reports cannot be expected for 4 days or more. Many body sites have anaerobic normal flora. Culture of such sites is unprofitable (eg. skin, mouth, throat, sputum, vagina and bowels).			
Ancylostomiasis (see Hookworm Disease)			
Anthrax *(Bacillus anthracis)*	Isolate Swab or pustular fluid from skin lesion in TM Sputum in rare instances of pulmonary infection Blood for culture	Identification, toxin testing Microscopy and special culture Culture	CM
NOTES: Use gloves and mask for collection. If lesion is dry, moisten swab in sterile water, saline or broth and rotate beneath the edge of the eschar. Notify the laboratory when anthrax is suspected and mark the requisition clearly "suspect anthrax." Consider notification of regional MOH.			
Arbovirus infections (Arboviruses)	Clotted blood or serum	Serology (Referred out)	SE
NOTES: Consult with laboratory, Virology Section, for submission of brain biopsies. Requests for other than West Nile Virus are referred out to the National Microbiology Laboratory.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Ascariasis *(Ascaris lumbricoides)*	Feces in SAF Worm (passed in feces or vomit)	Microscopy for ova Identification of worm	PA
NOTES: Worms may be submitted in sterile urine container with or without formalin or alcohol preservative. Infected persons must be treated.			
Aseptic meningitis (see Meningitis, viral)			
Aspergillosis *(Aspergillus fumigatus Aspergillus species)*	First morning respiratory secretion Biopsy material Pus	Microscopy and fungal culture	CM
	Clotted blood or serum	Serology (Referred out)	SE
NOTES: May be a contaminant in sputum and isolation does not necessarily indicate infection. Please indicate on requisition form if aspergillosis is suspected.			
Atypical mycobacteria (see Mycobacteria)			
Atypical pneumonia (see *Mycoplasma* infections; also Pneumonia, viral and other non-bacterial)			
Balanitis (Various bacteria and yeast)	Swab in TM	Microscopy and culture	CM
Balantidiasis *(Balantidium coli)*	Feces in SAF Scrapings of ulcerated bowel (sigmoidoscopic)	Microscopy for trophozoites and cysts	PA
Bilharziasis (see Schistosomiasis)			
Biotinidase deficiency	Newborn screening card	Qualitative spot test and semi-quantitative spectrophotometry	NBS/ PHC

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Blastomycosis (North American) *(Blastomyces dermatitidis)*	Scrapings from skin lesions Purulent exudate from base of skin lesion Aspirated material from abscesses Sputum Cerebrospinal fluid	Microscopy and fungal culture	CM
	Serum	Serology (Referred out)	SE
NOTES: A dimorphic fungus found in the Kenora area, and in Southeast Manitoba. Consult with the laboratory and mark requisition clearly "blastomycosis suspected."			
Bornholm's Disease (see Coxsackievirus infections)			
Botulism *(Clostridium botulinum* types A, B, and E)	Isolate Feces, tissue exudate in TM, gastric contents unfixed	Confirmation Culture for *C. botulinum* neurotoxin detection in blood, food, vomit or gastric contents (Referred out)	CM
	Clotted blood or Serum (3 X 10 mL)		SE
NOTES: Consult laboratory ASAP! Relevant clinical information is required. Collect in sterile screw-capped jars. Transport immediately. Take blood early in illness (30 mL if possible) BEFORE giving antitioxin. Very rarely *C. botulinum* causes wound infections.			
Bronchiolitis and viral respiratory disease (Respiratory syncytial virus; adenovirus, parainfluenza, influenza)	NPA, NPS in VTM	Viral culture IMA	VD
NOTES: Throat swabs will not be rejected, but sensitivity reduced. Pack specimens for virus isolation in cold packs and send by fastest possible means. DO NOT FREEZE (or RSV will not survive).			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Brucellosis *(Brucella abortus, B. melitensis, B. suis)*	Isolate Blood for culture	Identification and Typing Culture	CM
	Clotted blood or Serum	Serology (Referred out)	SE
NOTES: Multiple cultures are recommended; they are given prolonged incubation before being reported as negative. Interpretation of serologic findings is difficult in some chronic infections, consult the laboratory.			
Campylobacter infections *(Campylobacter jejuni, C. coli)*	Feces Rectal swab in TM	Culture	CM
NOTES: Major cause of sporadic gastroenteritis, occurring in summer and early fall. Highest incidence in infants and young children, associated with ingestion of contaminated milk and water or improperly handled or cooked food - primarily poultry products.			
Candidiasis *(Candida albicans Candida spp.)*	Mouth, throat, cervical vaginal or urethral swabs in TM Skin and nail scrapings Urine	Microscopy and culture	CM
NOTES: If pulmonary involvement suspected, submit transtracheal or lung aspirates. Refrigerate samples if delay in transport.			
Carditis (see Coxsackie virus infections)			
Catscratch fever *(Bartonella henselae)*	Lymph node biopsy	Special pathology (Referred out)	CM
	Tissue - unfixed	PCR	
	Clotted blood or Serum	Serology (Referred out)	SE
NOTES: Tissue to be delivered on ice ASAP. Please phone lab.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Cercopithecine herpes virus (simian herpes virus, Herpes B virus)	Wound swab in VTM Clotted blood or serum, 3-4 mL CSF, biopsy or necropsy tissue in VTM	Viral culture (Referrred out) PCR (Referred out)	VD
NOTE: In all cases, contact the lab before collecting or submitting specimens.			
Cervicitis (see Gonorrhoeae, Chlamydial Infections)			
Chagas disease *(Trypanosoma cruzi)*	Blood films (thick and thin; unstained) Lymph aspirated from nodes or chagoma	Microscopy PCR (Referred out)	PA
	Clotted blood or Serum	Serology (Referred out)	SE
NOTES: Endemic occurs in Central and South America.			
Chancroid (Soft chancre) *(Haemophilus ducreyi)*	Swab of pus or scrapings from lesions Dacron swab in 2SP CTM	Special culture PCR (Referred out to National Microbiology Lab)	CM
NOTES: **Culture requires special medium and is available only by special request. Please phone lab: 945-7204.** There is no optimal transport medium available, but Amies charcoal TM may be used. Transport to CPL immediately. Requests for molecular testing must include clinical background leading to suspicion of *H. ducreyi* infection in a patient, including any additional factors that may increase the probability of *H. ducreyi* infection. Swab samples for molecular testing require dacron swab and 2SP CTM. Phone lab at 945-7204 to obtain 2SP CTM.			
Chickenpox (Varicella) Shingles (Zoster) (Varicella-Zoster virus)	Vesicle fluid Base of lesion swabbed vigorously In VTM	Electron microscopy and Viral culture Rapid test - DFA	VD
	Clotted blood or serum or plasma	Serology	SE
NOTES: Immune status: detection of IgG. Diagnosis: detection of specific IgM, presence indicates recent infection.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Chlamydophila infections: respiratory *Chlamydophila psittaci, C. pneumoniae* Ornithosis Psittacosis	Sputum or nasopharyngeal aspirate preferred Nasopharyngeal swab in 2SP Chlamydia TM is acceptable	PCR (Referred out)	CM
Pneumonitis TWAR	Serum	IFA	SE

NOTES: *C. pneumoniae* is tested for IgM on only acute sample. Please specify suspected genus and species.

Chlamydia infections: STI and others *Chlamydia trachomatis* Trachoma Inclusion conjunctivitis N.G.U. Infantile pneumonitis P.I.D. Prepubertal vaginitis	Cervical swab Urethral swab Urine-first void (20-30 mL) (see 2.2)	NAAT (GenProbe Aptima)	CM
	Tracheal secretions Nasopharyngeal secretions Rectal swab (anal columns) Throat swab	DFA (Microtrak)	
	Conjunctival swab	NAAT (genProbe Aptima) DFA (Microtrak)	
	Serum	IgM in neonatal infections Serology	SE
Lymphogranuloma venereum (LGV) (see Lymphogranuloma Venereum (LGV))			

NOTES: For NAAT testing by GenProbe Aptima, only cervix swabs, urethral swabs and urine are acceptable. If eye swabs are submitted for NAAT, results will be reported as "for investigational purposes only." Vaginal swabs are not appropriate. Please use the swabs provided in the kit, and place only the blue swab in the tube. Do not discard the liquid preservative in the tube. Positive GenProbe samples are retained for 3 weeks in event further testing is required.
The presence of IgM-antibody is diagnostic.

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Cholera *(Vibrio cholerae* including the El Tor biotype)	Isolate Feces	Typing (Referred out) Microscopy and culture	CM
NOTES: Specify on requisition if cholera is suspected.			
Chromoblastomycosis *(Phialophora species, Cladosporium carrionii)*	Scales from skin lesions Pus Sputum Biopsy	Microscopy and fungal culture	CM
Clostridium difficile (antibiotic-associated diarrhea, pseudomembranous colitis) *(Clostridium difficile* toxin)	Feces (10 mL)	Cytotoxin testing Special culture Rapid toxin test	CM
NOTES: Request *C. difficile* testing. Inappropriate specimens include swabs, stool in transport medium or fixative, and formed stools. *C. difficile* culture from stool is by special request only.			
Colitis (See *Clostridium difficile)*			
CJD (Creutzfeldt-Jakob disease) (Protein 14-3-3)	CSF (1 mL)	Immune blot (Referred out)	VD
NOTES: Please contact Lab before sending.			
Clonorchiasis *(Opisthorchis)* *(Clonorchis sinensis),* the Chinese liver fluke *Metorchis conjunctus* (Canadian liver fluke)	Feces in SAF	Microscopy for ova	PA
NOTES: Occurs in the Far East. May persist twenty years or more. In North America, mainly in Aboriginals. It is difficult to differentiate the ova of these and related species and when in doubt they are reported as 'opisthorchid' ova.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Clostridial infections (see Anaerobic Infections and Gas Gangrene			
CMV (see Cytomegalovirus)			
Coccidiomycosis *(Coccidioides immitis)*	Sputum Aspirated material Pleural fluid Biopsy material Cerebrospinal fluid	Microscopy and fungal culture	CM
	Clotted blood or Serum	Serology (Referred out)	SE
NOTES: Infection is generally contracted in arid areas of North America, especially California, therefore a travel history is helpful. Mark requisition clearly "coccidioides suspected."			
Common cold or minor respiratory illness (rhinovirus)	NPA/NPS or Throat swab in VTM Nasopharyngeal aspirate in VTM	Viral culture	VD
NOTES: Laboratory confirmation rarely necessary. Testing only recommended as part of an outbreak investigation.			
Congenital adrenal hyperplasia (CAH)	Newborn screening card	MS/MS	NBS/ PHC
Congenital primary hypothyroidism	Newborn screening card	Fluoroimmunoassay for TSH	NBS/ PHC
Congenital infections (Various including rubella, herpes, cytomegalovirus, toxoplasma, Listeria, Chlamydia, Group B *Streptococcus)*	EDTA plasma Body fluids (urine, CSF, amniotic fluid, etc.) Tissues (biopsies)	NAAT Viral culture Culture for bacteria	VD CM
	Clotted blood or serum	Serology	SE
NOTES: See under the individual causative agents.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Conjunctivitis (Many bacteria including Staphylococcus, Haemophilus spp., Streptococcus pneumoniae, Moraxella spp, Neisseria gonorrhoeae, Chlamydia trachomatis, and several viruses, including Herpes simplex virus and Adenovirus)	Conjunctival swab in Amies charcoal TM	Microscopy and culture	CM
	Swab for chlamydia	NAAT (Gen Probe Aptima) DFA (Microtrak)	
	Swab in VTM	Viral culture	VD
	Clotted blood and serum or plasma	Serology	SE
NOTES: Use Amies Charcoal transport medium for bacterial causal agents. Use NAAT or DFA collection kits for chlamydia. If specimen submitted for NAAT, results will be reported as "for investigational purposes only." Swabs to be cultured for viruses must be sent in VTM. Take specimens before using topical anesthetics which may be anti-microbial. Serology for Herpes.			
Contagious pustular dermatitis (see Poxvirus Infections)			
Coryza (see Common colds)			
Cowpox (see Poxvirus Infections)			
Coxsackievirus infections (including aseptic meningitis, pleurodynia (Bornholm disease), febrile illness often with rash; Hand, foot and mouth disease; myocarditis, pericarditis, etc.) Herpangina (Coxsackievirus A, types 1-24 Coxsackievirus B, types 1-6)	Feces Vesicle fluid, Throat swab in VTM	Viral culture	VD
	CSF	Viral culture NAAT	

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Creutzfeldt-Jakob disease (See CJD)			
Croup (Parainfluenza virus Influenza virus, Respiratory syncytial virus (RSV) and *Bordetella pertussis)*	NPS, NPA or Throat swabs in VTM	Viral culture IMA (where applicable)	VD
	NPS, NPA or throat swab in Amies charcoal medium	Bacterial culture	CM
Cryptococcosis *(Cryptococcus neoformans)*	CSF Sputum Aspirated material from abscesses Biopsy material (ulcers, lymph nodes)	Microscopy and culture Antigen detection (Referred out)	CM
	Serum	Serology (Referred out)	SE
Cryptosporidium Speciation	Feces in SAF Feces without Preservative	Microscopy (Referred out)	PA
NOTES: Cryptosporidium must be specifically requested on the requisition. Upon approval, speciation will be referred out for public health purposes.			
Cyclospora cayetanensis	Feces in SAF	Microscopy	PA
Cysticercosis *(Taenia solium)*	Clotted blood or serum	Serology (Referred out)	SE
Cystitis (see Urinary Tract Infections)			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Cytomegalovirus infections (Cytomegalovirus)	Urine Throat wash, biopsy Autopsy material in VTM Bone marrow aspirate EDTA blood* *See 4.2.1 for collection instructions	Viral culture PCR	VD
	Clotted blood, serum or plasma	Serology	SE
NOTES: Send urine in sterile bottle, URGENTLY. (Do not freeze, 4°C is optimal). In urine, CMV is very labile at 25°C. It is also slow growing, culture may take 20 days or more. Prolonged excretion of virus in urine and saliva may occur in both congenital and acquired infection. Blood may be collected at any time during the illness.			
Dengue (see Arbovirus infections)			
Dermatophytosis *(Epidermophyton floccosum Microsporum spp. Trichophyton equinum, T. mentagrophytes, T. rubrum, T. tonsurans, T. verrucosum, T. violaceum)*	Skin scrapings Nail clippings Hair	Microscopy and fungal culture	CM
NOTES: Send complete affected hair. Wrap specimen in black paper. DO NOT USE slides, cotton, wool or tubes. Results of fungal culture may not be available until 2 to 3 weeks after receipt of specimen. Never use transport medium for skin scrapings.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Diarrhea, bacterial (see also Cholera; *Food poisoning; Paratyphoid fevers; Typhoid fever) (Numerous bacterial species including *Salmonella, Shigella Escherichia coli* (enteropathogenic and verotoxin producing strains), *Yersinia enterocolitica, Campylobacter, Plesiomonas shigelloides, Aeromonas spp.* and *Vibrio spp.*	Feces - 30 mL/10g. Fill container minimum 1/3 full and no more than 1/2 full. No fixative.	Culture *E. Coli* Verotoxin, *C. Difficile* Toxin FBI Investigation, Outbreak Investigation	CM
	Clotted blood or serum	Serology (Referred out for Yersinia)	SE

NOTES: Send material containing blood or mucus if these are present.
Feces is always preferable to a rectal swab but if fecal specimen unobtainable, send rectal swab in TM.
Enteropathogenic *E. coli* are reported only in feces of children less than 3 years of age except on special request.
Acute diarrhea requires one stool. No transport media or preservative.
Chronic diarrhea: submit stool on three separate days.
Outbreaks should be noted on the requisition. Contact the regional MOH to establish outbreak or FBI status and obtain outbreak code for clinical specimens.

Diarrhea, Infantile (see also Diarrhea, viral) (Specific serotypes of *Escherichia coli, Campylobacter spp. Aeromonas spp.)*	Feces - fill container minimum 1/3 full and no more than 1/2 full. No fixative.	Culture Verotoxin testing	CM

NOTES: Commonly due to certain specific serotypes of *Escherichia coli* termed enteropathogenic serotypes, eg. 0111, 055, 0119, etc.
Screening for these organisms is done on all fecal specimens from children under 3 years of age.

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Diarrhea, parasitic (See also Giardiosis, *Cryptosporidium*, *Cyclospora*, Balantidiasis, Ascariasis, Hookworm disease, Dysentery, amebic Diphyllobothiasis Microsporidiosis Teniasis, Trichostrongyloidiasis, Trichinosis, Trichuriasis, Worm infections)	Feces in SAF Segments of worm in feces	Microscopy for ova and parasites Antigen detection test	PA
	Clotted blood or serum	Serology (Referred out)	SE
NOTES: Multiple stool specimens are usually required to adequately rule out parasitic diarrhea. Three specimens collected on separate days is recommended.			
Diarrhea, viral (Rota, small round virus Enteroviruses (echo- and coxsackieviruses)), Enteric Adeno (Type 40-41), reoviruses	Feces (Fill container no more than 1/2 full). No fixative.	Viral culture EM EIA	VD
NOTES: When Rotavirus is suspected in infants, electron microscopy should be requested. This virus is probably the most common causal agent of winter vomiting and diarrhea in infants under 3 years of age. Fecal swab is a suboptimal specimen. Outbreaks should be noted on requisition. Contact the regional MOH to establish outbreak or FBI status and obtain code for clinical specimens.			
Diphyllobothrium *(Diphyllobothrium species* (fish tape worm))	Feces, in SAF Segments of worm in feces	Microscopy for ova and segments	PA
NOTES: Treatment of infected individuals is recommended.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Diphtheria *(Corynebacterium diphtheriae)*	Isolate	Confirmation and Toxigenicity	CM
	Throat swab NPS, Ear swab Swab from skin lesion in TM	Culture	
	Clotted blood or serum	Serology (Referred out)	SE
NOTES: If symptoms are suggestive of *C. diphtheriae* infection, please indicate on requisition "suspect *C. diphtheriae*". Toxigenicity tests are performed on all *C. diphtheriae* isolated. Serology for immune status testing only.			
Duodenal and gastric ulceration	Gastric Biopsy	Culture	CM
	Clotted blood or serum	Serology	SE
NOTES: Submit biopsy material in a wide-mouthed, screw-capped, sterile container with sufficient sterile saline to keep moist. Transport ASAP. If a delay is anticipated, transport with ice packs. For serology, please note on requisition if patient is on treatment. Pre- and 6-12 months post-bloods will be tested together.			
Dysentery, amebic *(Entamoeba histolytica)*	Feces in SAF	Microscopy for trophozoites and cysts	PA
	Clotted blood or serum	Serology (Referred out)	SE
NOTES: IHA serology relevant only for extraintestinal amebiasis.			
Dysentery, bacillary (see also Shigellosis) *(Shigella spp.)*	Isolate Feces	Speciation/typing Culture	CM
NOTES: Submit feces or rectal swab. Send material containing blood or mucus if these are present. Outbreak should be noted on the requisition. Contact the Regional MOH to establish outbreak or FBI status and obtain outbreak code for clinical specimens. Refrigerate if delay in transport.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Ear infections Otitis externa Acute otitis media, otomycosis (Several species of bacteria and fungi)	Ear swab in TM Pus aspirated through intact eardrum	Microscopy and culture	CM
Respiratory viruses	Ear swab in VTM	Culture	VD
NOTES: Place swab in transport medium. Mixed cultures generally occur; only pathogenic bacteria or fungi are reported unless a special request is made.			
Eastern equine encephalitis (see Arbovirus infections			
EBV (Epstien Barr Virus) See Infectious Mononucleosis			
Echinococcosis *(Echinococcus granulosus, E. multilocularis)*	Serum	Serology (Referred out)	SE
NOTES: Sensitivity of test will vary depending on size, integrity and location of cyst.			
Echovirus infections Aseptic meningitis, Rash, Diarrhea, Upper respiratory infection (Echoviruses, types 1-34)	Throat swab in VTM Feces CSF	Viral culture NAAT	VD
NOTES: See Coxsackie infections.			
Ectoparasites *(Arthropods)* See also Scabies	Parasite Hair with nits	Identification Microscopy and/or visual	PA
NOTES: Send in alcohol, if possible.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Encephalitis, viral, including epidemic, sporadic, and post-infectious types (Many viruses including arbo-, herpes- myxo-, paramyxo-, entero-, and poxviruses)	Throat swab in VTM Biopsy material (brain) Autopsy material in VTM Feces CSF	Viral culture NAAT	VD
NOTES: Biopsy material of brain may be sent in suspected herpes encephalitis. Consult with the laboratory before submitting brain biopsies. Never place the brain biopsy in formalin.			
Enteric fever (see Typhoid fever)			
Entamoeba histolytica *(see Dysentery, amebic, Amebic encephalitis, Amebic hepatitis)*			
Enterobiasis *(Enterobius vermicularis)*	Clear sticky tape applied to peri-anal region	Microscopy for ova	PA
NOTES: Pinworm ova are collected by pressing sticky side of clear cellophane (Scotch) tape against the peri-anal skin first thing after waking. The tape is then pressed onto a glass slide and sent for microscopic examination. Repeat exams may be necessary.			
Enterococcus colonization Enterococcus (VRE) (See below)	Swabs from rectum or ostomy, wounds, open skin lesions and/or line or device sites in TM Isolate	VRE Screen Typing	CM
NOTES: VRE or suspected VRE isolates may also be forwarded to CPL for genetic typing (Van A, B, C), and/or pulsed-field gel electrophoresis (PFGE).			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Enterococcus infection (*Enterococcus faecalis, E. faecium,* and other species) (See above)	Swab from wound in TM Infected body fluid Urine	Culture	CM
Enterocolitis *(Yersinia)* (see Diarrhea, bacterial and *Yersinia* Infections)			
Enteropathogenic *E. coli* See also diarrhea, bacterial; diarrhea, infantile	Feces Isolate	Culture Typing and toxin	CM
NOTES: These organisms are sought in all feces specimens from children less than 3 years of age, and cases of traveller's diarrhea. Specimens from other cases are examined for these serotypes on special request only.			
Enterovirus infections (see also Coxsackievirus infections; Echovirus infections; Poliomyelitis)	Throat swab in VTM Feces CSF	Culture NAAT	VD
Epidemic keratoconjunctivitis (see Adenovirus infections and Conjunctivitis)			
Epidemic myalgia or pleurodynia (see Coxsackie virus infections)			
Epiglottitis, acute *(Haemophilus influenzae)*	Nasopharyngeal swab in TM Throat swab in TM	Culture	CM
NOTES: Rapidly progressive, often fatal disease. Take respiratory tract specimens only after intubation.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Epstein Barr Virus (EBV) (See Infectious Mononucleosis)			
Equine encephalitis, Eastern, Western or Venezuelan forms (see Arbovirus infections)			
Erysipelas (see Streptococcal infections)			
Erysipeloid *(Erysipelothrix rhusiopathiae)*	Inject saline into lesion and re-aspirate Biopsy	Culture	CM
NOTES: History of animal or fish contact is usual in this cutaneous disease, usually of the hand and fingers. Clean and disinfect skin before sampling.			
Erythema infectiosum (5th disease) (Parvovirus B_{19})	Clotted blood, serum or plasma EDTA blood	Serology IgM & IgG NAAT (referred out)	SE VD
ESBL (Extended-spectrum Beta lactamase) *(E.coli, Klebsiella spp.)*	Isolate Screening Rectal swab	ESBL confirmation Culture	CM
NOTES: Screen swabs are to be requested only on consultation with the CPL Medical Director.			
Fasciola *(Fasciola gigantica F. hepatica)*	Feces in SAF	Microscopy	PA
Favus (see Dermatophytosis)			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Fetal neural defects, trisomy 21 or 18 and SLOS (Maternal serum screening, AFP) (see also Quad Test)	Clotted blood or serum between 15-18 weeks gestation Amniotic fluid (AFP only)	Chemiluminescent immunoassay	NBS/ PHC
NOTES: Submit with the fully completed maternal serum screening requisition.			
Filariasis (see also Loiasis; Onchocerciasis)	Blood smear, thick or thin or Blood with anti-coagulant	Microscopy for microfilariae	PA
(Wuchereria bancrofti)	Clotted blood or serum	Serology (Referred out)	SE
NOTES: Some specimens are periodic so optimal collection times may vary. Consult with Parasitology at CPL at 945-7825.			
Food poisoning, acute bacterial, viral and toxic forms (see also Botulism)	Feces - fill container Minimum 1/3 full and no more than 1/2 full. No fixative	Culture, tests for toxin where indicated	CM
(Staphylococcus aureus, Salmonella spp.,	Isolate	Typing as indicated	
Clostridium perfringens, Listeria spp., Shigella spp., Vibrio spp. Bacillus cereus Yersinia spp., Verotoxin	Clotted blood or serum	Serology (Referred out for Yersinia)	SE
Small round and other enteric viruses)		Culture EM	VD
NOTES: Outbreaks should be noted on the requisition. Contact Regional MOH to establish outbreak or FBI status and obtain outbreak code for clinical specimens.			
Fungal infections (see Dermatophytosis, and individual fungal infections)			
Galactosemia and galactosemia variants	Newborn screening card	Spectrophotometry	NBS/ PHC

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Gas Gangrene *(Clostridium perfringens, C. septicum, C. novyi* and other species)	Swabs from lesions in TM Necrotic tissue	Microscopy and culture	CM
NOTES: Anaerobic streptococci may cause similar lesions.			
Gastritis, peptic ulcers (see Duodenal and Gastric Ulceration)			
Gastroenteritis (see Diarrhea - bacterial, infantile, parasitic and viral. Food poisoning)			
German measles (see Rubella)			
Giardia *(Giardia lamblia)*	Feces in SAF	Microscopy for trophozoites and cysts	PA
NOTES: Examination of duodenal aspirates may be helpful.			
Gonorrhea *(Neisseria gonorrhoeae)*	GenProbe Aptima swab of urethra, cervix, prepubertal vagina, conjunctiva	NAAT	CM
	Urine (first void 20-30 mL) (see section 2.2)	NAAT	
	Swab of throat, rectum, ovaries and fallopian tubes, vagina in charcoal TM	C&S	
	Joint aspirate		
	Isolate	Typing and sensitivity	
NOTES: For GenProbe Aptima unisex swab collection kits, immerse blue swab in the provided preservative. Do not discard liquid or swab. Positive GenProbe samples are retained for 3 weeks in the event further testing is required. Conjunctival swabs in charcoal transport media for culture are preferred, if transport time is less than 48 hours. An air dried smear for chlamydia should accompany any NAAT specimens from pre-pubertal children (one streak approx. 1.5 inches or 3 cm. long on a clean glass slide). If eye swab submitted for NAAT, results will be reported as "for investigational purposes only."			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Group B Streptococcus agalactiae (prenatal screen) (see Streptococcal infections)			
Guillain-Barre syndrome (Echo, Coxsackie, EBV, WNV, *Campylobacter)*	Throat swab in VTM Feces CSF	Viral culture NAAT	VD
	Feces	Culture	CM
Hand-foot-and-mouth disease (Coxsackie group A viruses, especially types 16 and 9)	Vesicle fluid or swabs Feces Throat swabs in VTM	Viral culture	VD
Hantavirus (Muert canyon virus) (Sin Nombre virus)	Clotted blood or serum Tissue	Serology Referred out to Federal lab	SE VD
Helicobacter pylori (see Duodenal and gastric ulcerations)			
Hemolytic uremic syndrome (HUS) (Verotoxin producing *Escherichia coli, Shigella)*	Feces - fill container minimum 1/3 full no more than 1/2 full.	Direct fecal Verotoxin test (FVT) VT from Colony Sweeps (VT/PECS)	CM
NOTES: Send refrigerated stool as soon as possible without transport medium or fixative.			
Hepatitis A (Infectious hepatitis) (Hepatitis A virus)	Clotted blood Serum or (EDTA) plasma	Serology	SE
NOTES: Anti-HAV IgM is present in patients with acute hepatitis A infections. Presence of Anti-HAV IgG indicates immunity.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Hepatitis B (Serum hepatitis) (Hepatitis B Virus)	Clotted blood Serum or (EDTA) plasma	Serology Viral load	SE
NOTES: HBsAg is present in patients with acute or chronic hepatitis. For interpretation of other tests, contact the laboratory.			
Hepatitis C (Hepatitis C Virus)	Clotted blood, serum or EDTA plasma	HCV antibody, HCV, RNA, RIBA, Viral load Genotyping	SE
NOTES: Hepatitis C accounts for a large proportion of cases of what was previously known as Non A-Non B Hepatitis.			
Hepatits D, E	Clotted blood, serum or EDTA plasma	Serology (Referred out) Molecular detection and genotyping by RT-PCR (Referred out)	SE
Herpangina (Coxsackie A viruses)	Swab from lesions Throat swabs in VTM Feces	Viral culture	VD
NOTES: Infrequently isolated in tissue culture.			
Herpes B Virus (*simian* herpes) (see Cercopithecine herpes virus)			
Herpes simplex virus infections (including herpes encephalitis, neonatal herpes, eczema herpeticum, genital herpes) (Herpes virus type I and II)	Cerebrospinal fluid Vesicle fluid Base of lesion swabbed vigorously in VTM Throat swab, Biopsy material, Autopsy material or Urethral swab in VTM	NAAT Electron microscopy examination of vesicular fluid Viral culture DFA (with ID approval)	VD
	Clotted blood and serum or plasma	Serology	SE
NOTES: For herpes encephalitis, brain biopsy may be sent after consultation with CPL Virology Section. A positive serum HSV IgM test is indicative of a recent infection.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Herpes zoster (see Chickenpox)			
Heterophyiasis *(Heterophyes heterophyes Metagonimus yokogawai Opisthorchis)*	Feces in SAF	Microscopic examination for ova	PA
NOTES: Occurs in Middle and Far East and Southern Europe.			
Histoplasmosis *(Histoplasma capsulatum)*	Bronchial washings Sputum Swab or scrapings from ulcer Biopsy material (lymph nodes, marrow) Cerebrospinal fluid	Microscopy and fungal culture	CM
	Clotted blood serum	Serology (Referred out)	SE
NOTES: *Histoplasma capsulatum* may be present in soil contaminated by birds and bats. Consult with the Lab & clearly mark requisition "Histoplasma suspected".			
Hookworm disease, ancylostomiasis (see also Trichostrongyliasis) *(Ancylostoma duodenale, Necator americanus, Trichostrongylus species)*	Feces in SAF	Microscopy examination for ova and larvae	PA
Hydatid Disease (see Echinococcosis)			
Hymenolepiasis *(Hymenolepis nana H. diminuta)*	Feces in SAF	Microscopy examination for ova	PA

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Impetigo *(Streptococcus pyogenes, Staphylococcus aureus)*	Swabs from lesions in charcoal TM	Culture	CM
	Clotted blood or serum	Serology (streptococcal)	SE
NOTES: Nephritis is occasionally associated with impetigo. Culture is most indicated during outbreaks.			
Infantile diarrhea (see Diarrhea, Infantile)			
Infectious hepatitis (see Hepatitis, A, B, C, D, E)			
Infectious mononucleosis (Epstein Barr virus, EBV)	Clotted blood or serum	Serology	SE
	EDTA blood should be taken and delivered to CPL on Mon. or Tues. before 4:30 p.m. or Wed. before 12:00 p.m.	NAAT	VD
Influenza (Influenza viruses types A and B)	Nasopharyngeal swab or aspirate in VTM Throat swab or washing in VTM Autopsy material (lung) in VTM, BAL, Tracheal aspirates	Viral culture IMA NAAT	VD
NOTES: Outbreaks should be noted on the requisition. Contact the regional MOH to establish outbreak and obtain code for clinical specimens.			
Kala Azar (see Leishmaniasis, visceral form)			
Keratoconjunctivitis, viral (see Adenovirus infections; Herpes simplex infection)			
Keratomycosis (Many fungi)	Corneal scrapings	Fungal culture	CM
NOTES: Consult the Mycology Section before sending specimens.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Laryngitis, bacterial and acute laryngotracheo-bronchitis (croup) *(Corynebacterium diphtheriae, Haemophilus influenzae, Streptococcus pyogenes* and other organisms)	Throat swab in TM Aspirated respiratory secretion	Culture	CM
NOTES: The majority of cases are caused by viruses.			
Laryngitis, viral and acute laryngotracheo-bronchitis (croup) (Several viruses, including adeno-, parainfluenza, measles, respiratory syncytial, influenza, rhino-, and echoviruses)	NPA, NPS Throat swab in VTM	Viral culture IMA	VD
NOTES: Send specimens for viral isolation on a cold pack. DO NOT FREEZE.			
Legionnaires' disease *(Legionella pneumophila)*	Sputum Lung biopsy Bronchoscopy Specimens Tracheal secretions or aspirates Isolate Urine	Culture DFA Typing Antigen detection	CM
	Paired clotted blood or serum 21 days apart	Serology	SE
NOTES: May mimic viral pneumonia. DFA not done on sputum. Transport specimens in sterile dry containers. Add a small amount of sterile non-bacteriostatic, distilled water to prevent desiccation if necessary. Do not add saline due to its inhibitory effect. Refrigerate in transit.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Leishmaniasis, cutaneous form *(Leishmania tropica)*	Biopsy from edge or base of lesions in skin Smear from edge of base of lesion	Microscopy Culture/PCR (Referred out)	PA
	Clotted blood or serum	Serology (Referred out)	SE
Leishmaniasis, mucocutaneous form (Espundia) *(L. brasiliensis, L. mexicana)*	Skin biopsy	Culture/PCR (Referred out)	PA
	Smear from edge or base of lesion	Microscopy	
	Clotted blood or serum	Serology (Referred out)	SE
Consult the laboratory before sending for culture/PCR. Special transport media required. NOTES: Occurs in Mexico, Central and South America.			
Leishmaniasis, visceral form (Kala Azar) *(L. donovani)*	Bone marrow films Biopsy material (spleen, liver, lymph nodes)	Microscopy PCR (Referred out) Culture (Referred out)	PA SE
	Clotted blood or serum	Serology (Referred out)	SE
Consult the laboratory before sending for culture/PCR. Special transport media required.			
Leprosy *(Mycobacterium leprae)*	Biopsy of tissue affected, usually skin nodes Nasal scrapings	Microscopy	CM
NOTES: *M. leprae* cannot usually be cultured in vitro. Diagnosis is essentially a clinical one, supported by demonstation of acid-fast bacilli in the specimen. Referred to HSC TB lab. For further information, call HSC TB lab at 787-7652.			
Leptospirosis *(Leptospira ictero-haemorrhagiae, L. canicola, L. pomona and others)*	Blood, Urine Autopsy material (liver, kidneys), CSF	PCR (Referred out)	CM
	Clotted blood or serum	Serology (Referred out)	SE
NOTES: Consult the laboratory before sending for PCR. Most infections are diagnosed serologically.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Listeriosis *(Listeria monocytogenes)*	Blood, CSF, Vaginal swab, Amniotic fluid, placenta	Microscopy and culture	CM
	Isolate	Typing	
NOTES: May cause meningitis, or granulomatous disease in the newborn or fetal death. Please indicate "possible Listeriosis" on requisition.			
Loiasis *(Loa loa)*	Thick and thin blood films, Blood with anti-coagulant	Microscopy examination for microfilariae	PA
Lung fluke disease (see Paragonimiasis)			
Lyme Disease *(Borrelia burgdorferi)*	Biopsy of tissue, CSF	Molecular testing (Referred out)	CM
	Clotted blood or serum		SE
NOTES: Molecular testing by prior arrangement only. Serology may be negative during first stage erythema chronicum migrans. Lyme CSF serology for IgG (referred out) available by special request. Consult laboratory for specific requirements.			
Lymphocytic choriomeningitis (LCM) (Lymphocytic choriomeningitis virus)	Blood (early), Urine Cerebrospinal fluid (late)	Referred out	VD
	Serum	Referred out	SE
NOTES: Provide patient history and onset of illness			
Lymphogranuloma venereum (LGV) (Chlamydia trachomatis Serovars L1, L2, L3) (see also Chlamydia Infections)	Dacron swab of: Bubo Anogenital ulcers (rectal, vaginal, urethral) If no ulcers – cervical, urethral, rectal swabs Fluid aspirate	PCR (Referred out)	CM
	Serum	Referred out	SE
NOTES: Place swabs in 2SP Chlamydia TM and transport as soon as possible. Also submit GenProbe Aptima urine, urethral or cervical swab for routine Chlamydia testing (see: Chlamydia Infections). Routine Chlamydial testing will not specifically confirm LGV and is not a substitute for the required specimens outlined above. A positive result for Chlamydia trachomatis by NAAT testing is required prior to PCR for LGV being done for any given specimen source. Relevant clinical information is required before testing will be performed. Consult CPL at 945-7184 prior to collection.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Maduromycosis *(Madura foot)* (see Mycetoma)			
Malaria *(Plasmodium vivax* *P. malariae, P. ovale,* *P. falciparum)* *P. Knowlesi*	Thick and thin blood films on separate slides or EDTA - whole blood Clotted blood or serum	Microscopy examination for parasites Referred out (only if microscopy is negative)	PA SE
NOTES: Take films at 6-18 hour intervals for 3 days. Air-dry blood films without heat.			
Measles, including diseases associated with the measles virus; giant cell pneumonia; encephalitis; subacute sclerosing panencephalitis (SSPE) (see also Panencephalitis) (Measles virus)	Throat swab, NP swab Autopsy material (lung, brain) in VTM Cerebrospinal fluid Urine Clotted blood or serum	NAAT-STAT basis (needs prior CPL approval) Serology	VD SE
NOTES: Presence of IgM is diagnostically significant. Consult the CPL Virology section prior to sending culture specimens.			
Melioidosis *(Burkholderia pseudomallei)*	Sputum Swab of abscesses in TM	Culture	CM
NOTES: Endemic in South-East Asia and Northern Australia. Travel history is helpful as it is found in tropical and sub-tropical areas worldwide.			
Meningitis, bacterial (see also Meningococcal infections) *(Neisseria meningitidis, Haemophilus influenzae, Streptococcus pneumoniae, Listeria monocytogenes,* and in the newborn, coliform organisms and Group B streptococci)	CSF, Skin lesions Swab in TM Isolate	Microscopy and culture Typing	CM
NOTES: Send specimens by most rapid means of transport. If delay in transport is anticipated, send a smear and up to 3 mL of CSF in pediatric blood culture bottle. Transport ASAP.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Meningitis, viral *(Aseptic meningitis)* coxsackie A and B, echo, mumps, measles, Less common causes are: lymphocytic choriomeningitis, poliomyelitis, herpes simplex, EBV, varicella-zoster, rubella, arboviruses, influenza, adenoviruses	Throat swab in VTM Autopsy material in VTM (brain, spinal cord, intestinal contents) Feces Cerebrospinal fluid	Viral culture NAAT	VD
NOTES: Consult with the CPL Virology Section prior to collection of brain biopsy. Clinical and epidemiological history must be provided.			
Meningococcal infections, including meningitis and meningococcemia *(Neisseria meningitidis)*	CSF Blood culture Swabs from petechial lesions in TM Isolate	Microscopy and culture PCR (consult with laboratory) (Referred out) Typing	CM
NOTES: Send specimens by most rapid means of transport. If delay in transport is anticipated, send a smear and up to 3 mL of CSF in pediatric blood culture bottle. Transport ASAP. PCR should not replace culture.			
Methicillin-resistant *Staphylococcus aureus* (MRSA) (See Staphylococcus colonization and Staphylococcus infections)			
Microsporidiosis	Feces in SAF	Microscopy for spores	PA
NOTE: Requires special request on requisition for special staining.			
Molluscum contagiosum (see Poxviruses)			
Moniliasis (see candidiasis)			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Mononucleosis, infectious (see infectious mononucleosis)			
MRSA (See Staphylococcus colonization and Staphylococcus infections)			
Mucormycosis (see Phycomycosis)			
Mumps, including complicating meningoencephalitis, pancreatitis or orchitis (Mumps virus)	Buccal swab CSF, Saliva Urine if orchitis present	Viral culture NAAT-STAT basis (needs prior CPL approval)	VD
	Clotted blood or serum	Serology	SE
NOTES: Presence of IgM is diagnostically significant.			
Myalgia, epidemic (see Coxsackievirus infections)			
Mycetoma (see also Maduromycosis) *(Actinomyces israelii, Exophiala jeanselmei, Nocardia species Streptomyces species, Pseudoallescheria boydii, Madurella spp.,* and other filamentous fungi)	Pus with or without granules Aspirated material from fluctuant areas Biopsy material using a wide-mouthed, screw-capped sterile container	Microscopy and fungal culture	CM
NOTE: Transport ASAP and refrigerate if a delay in transport is anticipated.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Mycobacteria, atypical (see also Tuberculosis) *(Mycobacterium kansasii, M. scrofulaceum, M. avium-intracellulare M. marinum (balnei), M. fortuitum,* and others)	Sputum Swabs of skin lesions or pus in TM Stool, Blood, Body fluids, Tissue, Bone marrow	Referred out to HSC	CM
NOTES: Please specify that examinations for these organisms are required. Referred to the HSC TB lab. For further information call the HSC TB lab at 787-7652.			
Mycoplasma infections *(Mycoplasma pneumoniae)*	Sterile fluids, tissue Respiratory secretions	PCR (Referred out)	CM
Mycoplasma pneumonia IgM	Clotted blood or serum	Serology	SE
Notes: *M. pneumoniae* causes primary atypical walking pneumonia. *M. pneumoniae* is tested for IgM on only acute samples.			
Mycoplasma Infections – Genital Mycoplasmas (Mycoplasmas hominis, Ureaplasma urealyticum)	Sterile fluids and tissue – neonates and children Placental swab, amniotic fluid Respiratory secretions (neonates and children) – NOT SPUTUM Urethral/cervical swab* Urines/semen*	Culture/PCR (Referred out)	CM
* Relevant history required for culture – physician must consult DSM Microbiology (St. Boniface General Hospital site) at 237-2484 to arrange for testing.			
Notes: For culture, specimens must arrive at CPL same day as collected, early enough to allow for shipment and arrival at reference lab on same day. Consult CPL at 945-7184.			
Myocarditis (Coxsackie B and other enteroviruses)	Throat swab in VTM Feces Pericardial fluid	Viral culture	VD

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Necrotizing fasciitis (Group A *Streptococcus)*	Swab in TM Tissue Isolate	Culture Typing (Referred out)	CM
Nephritis, acute glomerulo- (see also Streptococcal infections) (Sequelae of *Streptococcus pyogenes* infections)	Nose, throat or skin swabs in TM Clotted blood or serum	Microscopy and culture ASOT Anti-DNase B	CM SE
NOTES: Certain M serotypes (e.g. type 12) of *S. pyogenes* are associated with nephritis; strains isolated from cases will generally be typed but results may not be available for several weeks.			
Nocardiosis *(Nocardia asteroides Nocardia spp.)*	Sputum Pleural fluid Pus in TM	Microscopy and culture	CM
NOTES: Grows slowly in culture. Specify on the requisition if nocardiosis is suspected.			
Non-specific urethritis (see Trichomoniasis, *Herpes simplex, Candidiasis, Mycoplasma, Chlamydia trachomatis)*			
Onchocerciasis (see also Filariasis; *(Onchocerca volvulus, Mansonella streptocerca)*	Biopsy of skin Aspirated material from skin nodules Excision of nodule	Microscopy examination for microfilariae and search for adult worm	PA
Onychomycosis (see Dermatophytosis)			
Ophthalmia neonatorum (see Conjunctivitis)			
Orchitis, viral (see Mumps)			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Orf (see Poxvirus infections)			
NOTES: Usually transmitted from sheep to man.			
Ornithosis (see Chlamydia infections: respiratory)			
Osteomyelitis, acute (see also Staphylococcal infections) *(Staphylococcus aureus* and other bacterial species	Blood culture Purulent discharge from skin or other lesions in TM Aspirated pus in TM Swab from primary lesion in TM	Microscopy and culture	CM
Otitis media (see Ear infections)			
Otomycosis (see Ear infections)			
Pancreatitis, viral (Coxsackie B virus Mumps virus)	Stool for Coxsackie Buccal swab in VTM and urine for mumps	Viral culture NAAT-STAT basis (needs prior CPL approval)	VD
Panencephalitis, subacute sclerosing (see also Measles) (Probably associated with measles virus infections)	Clotted blood or serum CSF, Brain biopsy Postmortem specimen	Serology Viral culture (Referred out) NAAT-STAT basis (needs prior CPL approval)	SE VD
NOTE: Consult the laboratory for brain biopsy culture.			
Papilloma virus (Warts-Epidermal (genital) Uterine Cervical Dysplasia, Carcinoma)	Tissue biopsy Exfoliated cervical cells from transformation zone	NAAT (Referred out)	VD
Paracoccidiomycosis *(Paracoccidioides brasiliensis)*	Mouth (or lip) swab and scrapings, Pus Sputum Biopsy material	Microscopy and fungal culture	CM
	Clotted blood or serum	Serology (Referred out)	SE
NOTE: Please indicate presumptive paracoccidioidomycosis on requisition.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Paragonimiasis *(Paragonimus westermani)*	Feces in SAF	Microscopy examination for ova	PA
Parainfluenza virus infections including colds, pharyngitis, laryngitis, bronchiolitis, pneumonia (Parainfluenza viruses)	Nasopharyngeal aspirate Throat swab in VTM	Viral culture	VD
NOTE: Infection may give an anamnestic response to other paramyxoviruses, e.g. mumps.			
Paralytic illnesses caused by viruses (see also Encephalitis, viral, and individual viruses) (Several viruses, especially polio-coxsackie-, echo-, and herpesviruses, and as part of encephalomyelitis, or ascending myelitis syndromes) (Western Equine Encephalitis) WEE, (St. Louie Encephalitis) SLE (West Nile Virus) WNV	Throat swab in VTM Biopsy material (brain, spinal cord) Autopsy material in VTM (brain or spinal cord) Cerebrospinal fluid Feces	Viral culture NAAT	VD
NOTES: Consult the CPL Virology section for culture of biopsy material. No serology test available for polio.			
Paratyphoid fever *(Salmonella paratyphi* A, B, or C)	Feces Urine Blood Isolate	Culture Typing	CM
Paronychia, mycotic *(Candida albicans)*	Nail scrapings (base of nail)	Microscopy and fungal culture	CM
Parvovirus B_{19} (see Erythema infectiosum)			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Pasteurella infections (see also *Yersinia* infections; Plague) *(Pasteurella multocida)*	Swab from wound in TM Sputum Blood culture	Culture	CM
NOTES: Often transmitted by bites of animals; also causes chronic respiratory infection especially in persons with prolonged contact with animals. Relevant clinical information very helpful.			
Pediculosis *(Pediculus humanus capitus, Pediculus humanus corporis, Phthirus pubis)*	Parasites or ova in hair or under-clothing	Microscopy identification	PA
NOTE: May be submitted in alcohol.			
Pemphigus *(Staphylococcus aureus)*	Swab of vesicle fluid in TM	Microscopy and culture	CM
Pericarditis, viral (Coxsackie B viruses)	Feces Pericardial fluid	Viral culture	VD
Pertussis *(Bordetella pertussis, B. parapertussis)*	Nasopharyngeal swab in TM or Auger suction	Culture PCR	CM
NOTES: Organisms are very fastidious and difficult to isolate. Transport ASAP.			
Pharyngitis, bacterial (see also streptococcal infections; Diphtheria) (Several species of bacteria, especially *Streptococcus pyogenes, Corynebacterium diphtheriae, C. ulcerans)*	Throat swab in TM	Culture	CM
NOTE: Indicate any suspicion of diphtheria on requisition.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Pharyngitis, viral (Many viruses)	Throat swab in VTM Feces NP swab or aspirate	Viral culture	VD
Phenylketonuria (PKU)	Newborn screening card	Fluorometry	NBS/ PHC
Phycomycosis (Fungi in the class of Phycomycetes)	Scrapings from lesion in black paper or dry sterile container.	Microscopy and fungal culture	CM
NOTES: Most frequently associated with diabetes mellitus and other severe debilitating diseases, or during treatment with corticosteroids and antimetabolites.			
Pinta *(Treponema carateum)*	Clotted blood or serum	Serology tests for syphilis	SE
NOTES: Antibodies to the treponemes of pinta are indistinguishable from those to the treponemes of syphilis by all the diagnostic tests in current use.			
Pinworm infection (see Enterobiasis)			
Pityriasis versicolor *(Malassezia furfur)*	Skin scrapings or scales	Microscopy	CM
NOTE: Culture confirmation is not practical.			
Plague *(Yersinia pestis)*	Pus from buboes in TM Throat swab in TM, Sputum Blood culture Isolate Confirmation	Culture	CM
	Clotted blood or serum	Serology (Referred out)	SE
NOTES: Consult the laboratory if plague, which is endemic in the southwestern USA, is suspected. Label all specimens 'SUSPECT PLAGUE'.			
Pleurodynia, epidemic (see Coxsackievirus infections)			
Pneumonia, primary atypical (see Mycoplasma infections)			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Pneumonia, bacterial (Several bacterial species, especially *Streptococcus pneumoniae, Streptococcus pyogenes, Staphylococcus aureus, Klebsiella pneumoniae,* and *Haemophilus influenzae)*	Sputum Auger suction or transtracheal aspirate Throat swab in TM Lung aspirate Biopsy	Microscopy and culture	CM
Pneumonia, viral (Numerous viruses)	Nasopharyngeal swab or aspirate in VTM Throat swab in VTM Autopsy material (lung) in VTM	Viral culture RSV IMA NAAT	VD
Poliomyelitis (Polioviruses, types 1, 2, and 3)	Feces Cerebrospinal fluid Autopsy material (brain, spinal cord, intestinal contents) in VTM	Viral culture NAAT	VD
Poxvirus infections (Poxviruses: cowpox, vaccina, contagious pustular dermatitis (Orf). Milker's nodes (paravaccinia), and molluscum contagiosum))	Vesicle fluid, Exudate from skin lesions, Skin crusts, Scrapings from skin lesion in VTM Lesion smear	Electron microscopy Viral culture Electron Microscopy only	VD
NOTES: The differentiation between poxviruses and varicella (herpes virus) can be made within hours by electron microscopy.			
Protein 14-3-3 (see CJD)			
Psittacosis (see Chlamydophila infections: respiratory)			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Puerperal fever (Usually haemolytic streptococci)	High vaginal swab in TM Nose and throat swab in TM from mother Umbilical swab in TM from baby	Culture	CM
NOTES: If haemolytic streptococcal infection is suspected, take nose and throat swabs from the mother, and umbilical swab from baby.			
Pyelitis/Pyelonephritis (see Urinary tract infections)			
Pyoderma *(Streptococcus pyogenes Staphylococcus aureus)*	Swab in TM	Culture	CM
Pyrexia of unknown origin (PUO) (Infection due to various bacteria and other agents)	Feces, Urine	Culture	CM
	Clotted blood or serum	Serologic tests for enteric fever, brucellosis, tularemia and other infections	SE
Q fever *(Coxiella burnetii)*	Clotted blood or serum	Serology (Referred out)	SE
Quad Test (AFP/uE3/hCG/DIA)	Clotted blood or serum	Chemiluminescent immunoassay	NBS/ PHC
Rabies (Rabiesvirus)	Clotted blood or serum	Serology (Referred out)	SE
	Biopsy material	Referred out	VD
NOTE: Rabies test for immune status testing. Consult with CPL to arrange biopsy collection and transport.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Reiter's syndrome (see Non-specific urethritis)			
Relapsing fever, louse or tick-borne *(Borrelia spp.)*	Blood films Blood in citrate	Microscopy EIA	PA
	Serum	Serology (Referred out)	SE
Reovirus infections including upper respiratory infections and diarrhea (Reoviruses, types 1, 2, and 3)	Feces Throat swab in TM	Viral culture EM	VD
Respiratory infections, acute bacterial (see also under individual syndromes and diseases)	Sputum Auger suction Throat swab in TM	Microscopy and culture	CM
(Several bacterial species; especially *Streptococcus pyogenes, Corynebacterium diphtheriae, Streptococcus pneumoniae,* and *Haemophilus influenzae)*	Clotted blood or serum	Serology (Referred out)	SE
Respiratory infections, acute viral (see also under individual syndromes and diseases) (Numerous viruses, especially adeno-, rhino-, coxsackie-, influenza, and respiratory syncytial virus)	NPA, NPS Throat swab, Autopsy material (lung) in VTM	Viral culture IMA NAAT	VD

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Respiratory syncytial virus infections (Respiratory syncytial virus)	Nasopharyngeal aspirate in VTM NPS, ETT Autopsy material (lung) in VTM	Viral culture IMA Culture only	VD
NOTES: Virus unstable and specimens should NOT BE FROZEN, but should be kept cool (e.g. on cold pack). Transport to CPL as soon as possible after collection.			
Rheumatic fever (see also Streptococcal infections) (A sequelae to infection with *Streptococcus pyogenes)*	Throat swab in TM Clotted blood or serum	Culture Serology (ASOT, Anti-DNase B)	CM SE
Rhinovirus infections (see common cold)			
Rickettsial infections, Louse-borne typhus, Rocky Mountian Spotted Fever, Rickettsialpox Scrub typhus (see also Q fever) *(Rickettsia prowazekii R. typhi, R. rickettsii R. akari, Orientia tsutsugamushi* Various other species)	Clotted blood or serum	Serology (Referred out)	SE
Ringworm (see Dermatophytosis)			
Rocky Mountain Spotted Fever (See Rickettsial infections)			
Rotavirus	Feces	Electron microscopy	VD

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Rubella, German measles (Rubella virus)	Clotted blood, serum or plasma	Serology (Rubella IgG avidity - referred out)	SE
	Aborted material Placenta Throat swab in VTM Urine	Viral culture	VD
Rubella, congenital rubella syndrome (Rubella virus)	Urine Nasal swab, Throat swab, Autopsy material (all organs) in VTM Cerebrospinal fluid	Viral culture NAAT (Referred out)	VD
	Clotted blood or serum	Serology	SE
NOTES: Infants with congenital rubella infection may excrete virus in the urine for many months after birth.			
Rubeola (see Measles)			
Salmonella (see also Typhoid fever, paratyphoid fever, and food poisoning) *(Salmonella spp.,* over 2000 named serotypes)	Feces, Blood culture Urine Isolate	Culture Typing	CM
NOTES: In suspected typhoid/paratyphoid fever, cultures of blood and urine are indicated. Outbreaks should be noted on requisition. Contact the regional MOH to establish outbreak or FBI status and obtain outbreak code for clinical specimens.			
Salpingitis (see Gonorrhea)			
SARS (Severe acute respiratory syndrome)	Clotted blood or serum	Serology (Referred out)	SE
(SARS coronavirus)	Nasopharyngeal aspirate Stool	Viral Culture NAAT (Referred out) Electron microscopy	VD
NOTES: SARS investigation referred to NML. Please contact CPL prior to submission of specimens.			
Scabies *(Sarcoptes scabiei)*	Scrapings of skin at edge of tracks	Microscopy examination for mites	PA

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Scarlet fever, scarlatina (see Streptococcal infections)			
Schistosomiasis *(Schistosoma haematobium Schistosoma japonicum Schistosoma mansoni)*	Urine, for *S.haematobium* Feces in SAF Clotted blood or serum	Microscopy examination for ova Serology (Referred out)	PA
Schistosomal dermatitis (Swimmer's itch) (Trichobilharzia species)		No useful test	
NOTES: Common in lakes in North America. Notify regional MOH if suspected.			
Scrub typhus (see Rickettsial infections)			
Septicemia (Numerous bacteria)	Swabs of septic lesions in TM Urine	Culture	CM
NOTES: Cultures should be taken from any suspected focus of infection.			
Serum hepatits (see Hepatitis B)			
Severe acute respiratory syndrome (SARS) (see SARS)			
Shigellosis *(Shigella flexneri, Shigella sonnei, S. dysenteriae, S. boydii)*	Feces Rectal swab in TM Isolate	Culture Typing	CM
Shingles, zoster (see Chickenpox)			
Sore throat (see Pharyngitis)			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
South American Blastomycosis (see Paracoccidioidomycosis)			
Sporotrichosis *(Sporothrix, Sporotrichium schenckii)*	Pus from ulcerated lesions or aspirated from subcutaneous abscesses in TM	Microscopy and fungal culture	CM
Spotted fever (see Rickettsial infections)			
St. Louis encephalitis (see Arborvirus infections)			
Staphylococcus colonisation (MRSA, Methicillin resistant *Staphylococcus aureus)* (See also Staphylococcus infections)	Swabs from nares, throat, rectum or ostomy, wounds, line or device sites in TM Isolate	MRSA Screen Confirmation	CM
NOTES: MRSA isolates may also be forwarded to CPL for pulsed-field gel electrophoresis (PFGE).			
Staphylococcus infections (*Staphylococcus aureus* and some members of the coagulase-negative Staphylococci) (See also Food poisoning) (See also Staphylococcus colonisation)	Wound or nasal swab in TM Infected body fluids Urine CSF	Microscopy and culture	CM
NOTES: *Staphylococcus aureus* is commonly present in the nose and is reported in nasal swabs only if the requisition indicates that there is a lesion of the nasal passages or in the search for a carrier in relation to food poisoning or hospital outbreaks.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Streptococcal infections including scarlet fever (scarlatina), erysipelas, epidemic streptococcal sore throat and streptococcal-related illnesses such as acute glomerulonephritis, rheumatic fever. Necrotising fasciitis, toxic shock syndrome *(Streptococcus pyogenes* and other groups of streptococci)	Throat swab in TM Exudate from infected area	Culture	CM
	Clotted blood or serum	Serology	SE
NOTES: The current serologic tests are the ASOT and the ADB titres. An ASOT result of 200 or greater is diagnostically significant. ADB is referred out.			
Group B Streptococcus agalactiae (prenatal screen)	Combination vaginal/rectal swab	Culture	CM
NOTES: Prenatal screen recommended at 35-37 weeks gestation. Culture performed only with clinical information indicating pregnancy. As this is a transient coloniser, a negative culture does not guarantee absence of GBS at time of labour.			
Strongyloidiasis *(Strongyloides stercoralis)*	Feces in SAF	Microscopy examination for larvae	PA
	Clotted blood or serum	Serology	SE
NOTES: Single blood is adequate.			
Subacute sclerosing panencephalitis (See Panencephalitis)			
Swimmer's itch (see Schistosomal dermatitis)			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Syphilis *(Treponema pallidum)*	Swab, CSF, (min 0.5 mL), whole blood (min. 0.5 mL) EDTA or tissue biopsy Cerebrospinal fluid Clotted blood or serum	PCR (Referred out) Serology (FTA-ABS on CSF - Referred out)	SE
NOTES: Note that certain other treponemal infections, notably yaws, cause positive reactions in ALL the serologic tests used in the diagnosis of syphilis. Include relevant clinical signs or history for optimal testing. Placenta tissue may be submitted in cases of suspected congenital syphilis. Use Copan swabs in VTM to obtain specimens from the leading edge of the ulcer (serous exudate). Store and ship swabs, CSF and whole blood samples frozen if specimen cannot be forwarded to CPL the day of collection.			
Tapeworms (see Taeniasis and Diphyllobothriasis, Hymenolepiasis, Echinococcosis)			
Taeniasis *(Taenia saginata Taenia solium)*	Feces in SAF Worm, including segments	Microscopy examination for ova, and identification of segments	PA
NOTES: *T. saginata* - beef tapeworm. *T. solium* - pork tapeworm.			
Tetanus *(Clostridium tetani)*	Swabs from wounds and other lesions in TM Clotted blood or serum	Microscopy and culture Serology (Referred out)	CM SE
NOTES: See anaerobic culture for specimen submission details. Serology for immune status testing only.			
Throat infections (see Pharyngitis)			
Thrush (see Candidiasis)			
Toxocariasis (see Visceral larva migrans)			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Toxoplasmosis	Clotted blood or serum	Serology	SE
	Biopsy Contact Parasitology Lab	Microscopy	PA
Trachoma (see Chlamydial Infections *Chlamydia trachomatis)*			
Trichinosis *(Trichinella spiralis)*	Biopsy of muscle	Examination for larvae	PA
	Serum (Preferred)	Serology (Referred out)	SE
NOTES: A single serum sample is adequate.			
Trichomoniasis *(Trichomonas vaginalis)*	Air dried slide from Vagina or Urethra Prostatic secretions after massage	Microscopy	CM
NOTES: Secretions dried on glass slides can be examined by microscopy. Do not apply fixative.			
Trichostrongyliasis (see also Hookworm disease) *(Trichostrongylus species)*	Feces in SAF	Microscopy examination for ova	PA
NOTES: Occurs in Russia and the Orient.			
Trichuriasis *(Trichuris trichiura,* whipworm)	Feces in SAF	Microscopy examination	PA
Trypanosomiasis, African *(Trypanosoma rhodesiense, T. gambiense)*	Blood films, thick and thin Lymph node aspirated	Microscopy examination	PA
	Clotted blood or serum	Serology (Referred out)	SE
NOTES: Occurs in Tropical Africa.			
Trypanosomiasis, American (see Chagas' disease)			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Tuberculosis *(Mycobacterium tuberculosis, M. Bovis)*	Sputum Fluids from body cavities, joints, etc. Biopsy material (tissue, lymph glands, uterine curettings) Gastric washings Cerebrospinal fluid Purulent exudate in TM Urine, three early morning specimens	Referred out to HSC	CM
NOTES: Send early morning sputa on three consecutive days. All specimens are referred to HSC TB lab for culture. Positive results are sent as soon as available, but negatives are held for 8 weeks prior to being reported. For patients without spontaneous sputum, induction of cough and sputum by inhalation of a warm sterile aerosol of saline is preferred to gastric aspiration. Submission of both induced sputum and gastric contents gives the best results. For further information call the HSC TB lab at 787-7652.			
Tularemia *(Francisella tularensis)*	Clotted blood or serum	Serology (Referred out)	SE
	Swab from ulcer in TM Aspirated material from lymph nodes Blood culture Suspected isolate	Microscopy and culture	CM
NOTE: Culture examination only by special arrangement with the laboratory. Requisition should indicate "Suspect tularemia".			
Typhoid fever (Enteric fever) *(Salmonella typhi)*	Feces Urine Blood	Culture	CM
Typhus fever (see Rickettsial infections)			
Undulant fever (see Brucellosis)			
Urethritis (see Gonorrhea, Candidiasis, Chlamydia, Trichomoniasis, Herpes simplex, Mycoplasma)			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Urinary tract infections (Numerous bacterial species, including *E. coli, Klebsiella spp., Proteus species, Pseudomonas aeruginosa, Enterococcus spp., Staphylococcus aureus, S. saprophyticus)*	Midstream urine on Dip slides	Culture and sensitivity (semi-quantitative count)	CM
NOTES: Use dip slides. It is essential to indicate whether the patient is or recently has been on antibiotic therapy in order to assist interpretation of the findings. In general, counts of 10^8 CFU/L or more are significant.			
Vaccinia (see Poxvirus infections)			
Vaginitis (see Gonorrhea, Trichomoniasis Streptococcal infections, Candidiasis, Chlamydia infections)			
Varicella (see Chickenpox)			
Vancomycin-resistant Enterococcus (VRE) (See Enterococcus colonization and Enterococcus infections)			
Venezuelan equine encephalitis (see Arbovirus infections)			
Vibrio infections (Cholera is listed separately) (see also Food poisoning, Diarrhea, bacterial)	Blood culture Feces Wound	Microscopy and culture	CM

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Vincent's angina *(Fusobacterium fusiforme* concomitant with *Borrelia vincenti)*	Air dried smear from gums	Microscopy	CM
Viral hepatitis (see Hepatitis A, B, C, D, E)			
Visceral larva migrans *(Toxocara spp.)*	Clotted blood or serum	Serology (Referred out)	SE
NOTE: There are considerable cross-reactions in serologic tests with *Toxocara* and *Ascaris* antigens.			
Weil's disease (see Leptospirosis)			
Western equine encephalitis (see Arbovirus infections)			
West Nile Virus (WNV) infections (See also Arbovirus infections)	Clotted blood or serum	Serology	SE
NOTE: Serum in all cases is the specimen of choice.			
Whooping cough (see Pertussis)			
Worm infections (see also under individual parasites)	If possible send whole worm in saline Fix in 10% formalin	Identification	PA
Wound infections (Different species of aerobic and anaerobic bacteria)	Wound swab in TM	Microscopy and culture	CM
NOTE: See wound specimen collection.			
Yaws *(Treponema pertenue)*	Clotted blood or serum	Serological tests for syphillis	SE
NOTE: Antibodies to the treponeme of yaws are indistinguishable from those to the treponeme of syphillis by all the diagnostic tests in current use.			
Yellow fever (see also Arbovirus infections)	EDTA blood	PCR (Referred out)	VD
NOTE: For post-vaccine illness only.			

Disease or Syndrome (Causal Agent(s))	Specimen Requirements	Tests / Examinations	Section
Yersinia infections (see also Diarrhea; Plague) *(Yersinia Enterocolitica, Y. pseudotuberculosis)*	Blood culture Feces, Swab from abscess in TM Excised mesenteric lymph nodes	Culture	CM
	Clotted blood or serum	Serology (Referred out)	SE
NOTE: May cause enteritis, terminal ileitis and mesenteric lymphadenitis or chronic enteritis.			
Zoster (see Chickenpox)			
Zygomycosis (see Phycomycosis)			

8.0 FORMS AND REQUISITIONS

All forms and requisitions are available at website: www.gov.mb.ca/health/publichealth/cpl/forms.

Requisitions are also available by faxing a Supplies Request Form, also available at this website, to 786-4770.

Cadham Provincial Laboratory
Infectious Specimen Transport Guidelines

Specimen Type	Surface Transport	Air Transport
Exempt Human Specimens	Leak proof packaging "Exempt Human Specimen" Documentation: Waybill	Leak proof packaging "Exempt Human Specimen" Documentation: Waybill
Category A Specimens	Packaging: TC-125-1A Packaging Instruction: 620 Class 6.2 Infectious Substances UN2814 or UN2900 Documentation: Shipper's Declaration/Waybill • Specimens known or suspected of containing viable microorganisms. • Cultures or Isolates	Packaging: TC-125-1A Packaging Instruction: 620 Class 6.2 Infectious Substances UN2814 or UN2900 Documentation: Shipper's Declaration/Waybill • Microorganisms listed in Table 3.6 D, p. 96-97, 46th Ed. IATA DGR • Pathogens meeting the same criteria • Pathogens amplified by culture.
Category B Specimens	Packaging: TC-125-1B or equivalent Packing Instruction: 650 UN3373 Biological Substance, Category B Documentation: Waybill "Infectious Substance that does not meet the criteria to be included in Category A	Packaging: TC-125-1B or equivalent Packing Instruction: 650 UN3373 Biological Substance, Category B Documentation: Waybill "Infectious Substance that does not meet the criteria to be included in Category A

NOTES:

1) Probable Level III and Level IV organisms are to be telephoned in before delivery to CPL at (204) 945-6805
2) Level III and Level IV organisms should only be shipped during regular business hours and not on weekends or holidays.
3) If a specimen needs to be shipped after hours or on the weekend or holidays, please follow the callback procedure under General Guide to Laboratory Use.

Manitoba

BLUE BOX PACKAGING DIRECTIONS

When packaging ***DIAGNOSTIC SPECIMENS FOR TRANSPORT:***

MICROBIOLOGY and VIROLOGY specimens:

- Put diagnostic specimen into a sealable ziplock-specimen bag with requisition in the outer pocket.
- Put tissue specimens for viral studies in viral transport media vials and into a sealable ziplock-specimen bag with requisition in the outer pocket.
- Put tissue specimens for microbiology in sterile screw cap containers with a small amount of sterile saline into a sealable ziplock-specimen bag with requisition in the outer pocket.
- Put bag, with specimen upright, into foam inserts.
- Place foam inserts into the cooler, ensuring that white absorbent pads line the bottom of the cooler. Securely close blue transport box/cooler when finished.
- For large numbers of GC/chlamydia swabs, arrange swabs in a rack with corresponding requisitions in order. Place the rack in a large ziplock bag with absorbent pads. Place the requisitions in another ziplock bag. Place rack and requisitions in the blue transport box/cooler.

URINE and STOOL specimens:

- Put tightly closed specimen containers into a sealable ziplock-specimen bag and seal.
- Place requisition in the outside pocket of the sealable ziplock-specimen bag.
- Put bag, with specimen upright, into foam inserts.
- Place foam inserts into the cooler, ensuring that white absorbent pads line the bottom of the cooler. Securely close blue transport box/cooler when finished.

DIAGNOSTIC BLOOD specimens in venipuncture tubes (10 mL SST required):

- Centrifuge all SST before shipping.
- Put collection tube into foam insert.
- Put requisitions in corresponding order as per specimen location in foam insert.
- Place all requisitions in a large sealable ziplock-specimen bag and place in cooler.
- Place foam inserts with blood into a large ziplock bag and seal. There should be sufficient absorbent pads in this bag. Place this bag and requisitions in the cooler.
- Securely close blue transport box/cooler when finished.

NEWBORN SCREENING COLLECTION CARDS:

- Ensure blood spot is air dry and each card's flap is folded over.
- Place card(s) in the main body of the blue box and NOT BETWEEN the box and styrofoam liner.
- Securely close blue transport box/cooler when finished.
- Ensure cards remain dry throughout transport and place in plastic bag if necessary.

Note: Ship transport box/cooler as per your facility protocol.

FROZEN specimens:

- Put diagnostic specimen into foam insert.
- Put requisitions in corresponding order as per specimen location in foam insert and seal in a separate sealable ziplock-specimen bag.
- Place this bag over coolpack/icepack and put both into a sealable ziplock-specimen bag.
- Make sure that the ice pack is not in direct contact with the sample or requisition so it does not get wet if it thaws.
- If crushed ice is used, have the crushed ice inside the bag with the specimen in the outer pocket wrapped around by the ice. Then place this in a second specimen bag with the requisition in the outer pocket.
- Put into blue transport box/cooler, ensuring that white absorbent pads line the bottom of the cooler/blue transport box.
- Securely close blue transport box/cooler when finished.

SPECIMENS FOR TRANSSHIPPING:

CYTOLOGY specimens:

- Put diagnostic specimen into 90 mL Starplex container. Depending on specimen type, there may be about 40 mL of 50% ethanol or commercial Cytospin Collection Fluid in the container.
- Securely close the container and place in a sealable ziplock-speciman bag and seal bag.
- Place requisition in the outside pouch of the sealable ziplock-specimen bag.
- Put into blue transport box, ensuring that white absorbent pads line the bottom of the cooler.
- Securely close blue transport box/cooler when finished.

HISTOLOGY specimens:

1. Tissue cassettes

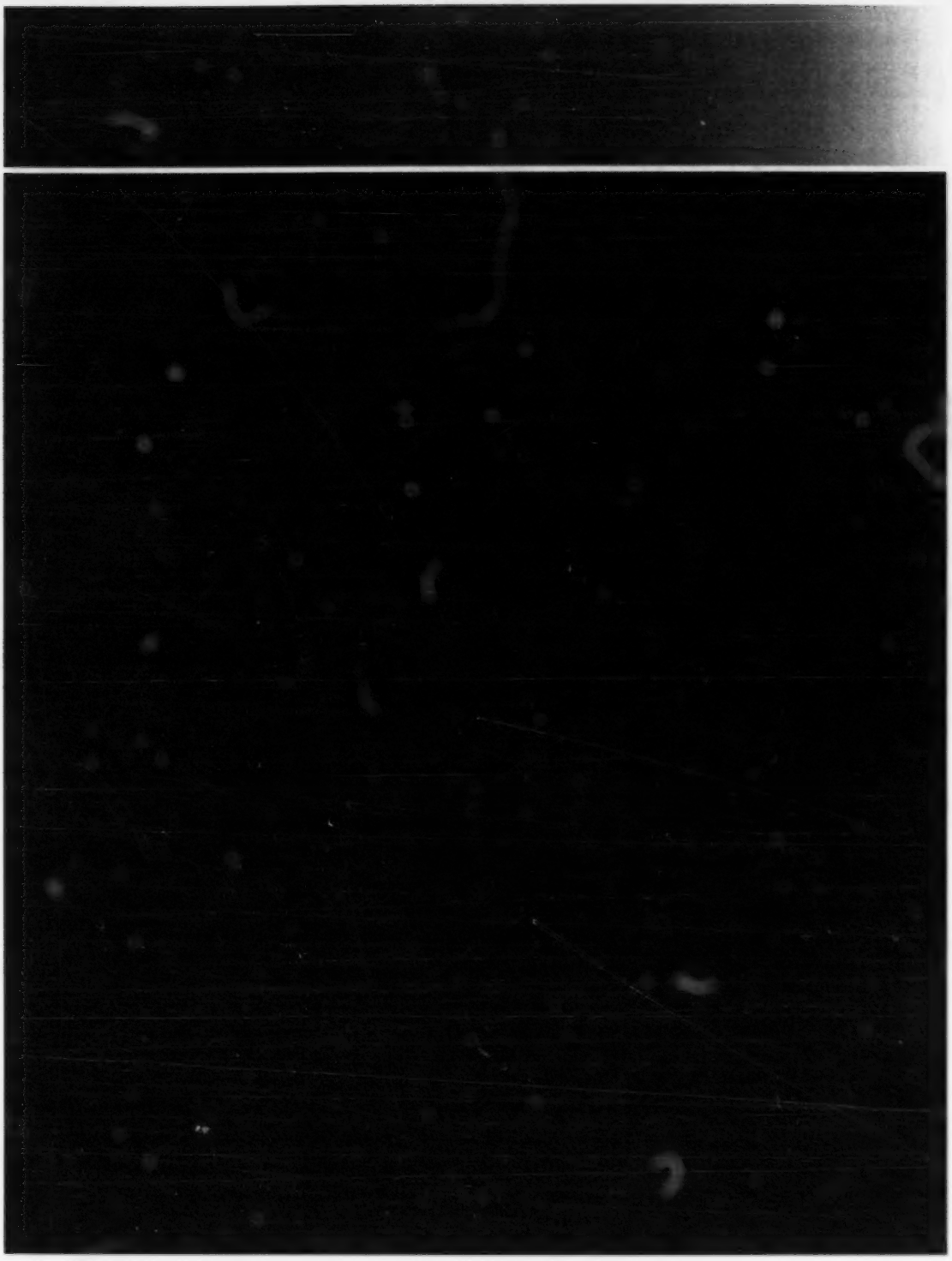
- Put tissue cassettes in cassette holder.
- Put cassette holder into a primary water-tight plastic container.
- Put about 300 mL 10% formalin into primary container
  - JUST enough lo keep cassettes covered.
- Put primary water-tight plastic container into a secondary water-tight plastic container, ensuring that the secondary container is lined with a BLUE mini-fan pad.
- Put into blue transport box/cooler, securely close blue packaging box/cooler when finished.

2. Slides

- Place slides in large cardboard slide carrier. Close cover.
- Put into blue transport box, securely close blue packaging box/cooler when finished.

3. Pathology specimens

- Put diagnostic specimen into 90 mL Starplex container containing about 30 mL of 10% formalin.
- Securely close the container and place in a sealable ziplock-specimen bag and seal bag.
- Place requisition in the outside pouch of the sealable ziplock-specimen bag .
- Put into blue transport box, ensuring that BLUE fan-pads line the bottom of the cooler.
- Securely close blue transport box/cooler when finished.



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